

THE EPHEMEROPTERA TYPES OF SPECIES

DESCRIBED BY A. E. EATON, R. McLACHLAN AND
F. WALKER, WITH PARTICULAR REFERENCE TO THOSE
IN THE BRITISH MUSEUM (NATURAL HISTORY)

By D. E. KIMMINS

SOME years ago I prepared a paper on the lectotypes of Trichoptera from the McLachlan collection and in the present work it is proposed to deal in a somewhat similar manner with the types of the Ephemeroptera described by the Rev. A. E. Eaton, R. McLachlan and F. Walker. The acquisition by the British Museum (Nat. Hist.) of the McLachlan collection in 1938 augmented considerably the number of our Ephemeroptera type-specimens. McLachlan did not describe many Ephemeroptera himself, but made his collection available to Eaton, who in return gave much of his own material to the McLachlan collection. Thus the latter was very rich in Eaton types, many of which had been for many years almost inaccessible to specialists. It is a curious fact, however, that in spite of the richness of the collection McLachlan seemed to take comparatively little interest in this group. In many cases Eaton's type-specimens bore no type-labels and were only rediscovered after very careful search. The types of some species are still missing and must be presumed lost or destroyed.

As with the Trichoptera, standard British Museum type-labels, as used in the Entomological Department—a circular label with the word "Type" encircled with a red ring (or green for Walker types)—have been added to all types recognized, and to types designated in this paper my own label "LECTOTYPE (or LECTOALLOTYPE), D. E. Kimmins det." with date has been added. Specimens from the McLachlan collection mostly bear a printed label on blue paper, giving the name over which they stood in the McLachlan collection, and all have a printed B.M. Registration number label, also on blue paper "McLachlan Coll., B.M. 1938-674". In the present work, to save space, only the register number is quoted.

The genera and species are arranged alphabetically in families, the present combination of genus and species being used, but the original combination is also given in its alphabetical position, with a reference to its present generic placing. Advantage has been taken of this paper to give figures of genitalia, etc., of a number of species, which it is hoped will make their recognition easier for other workers. References are also given to published figures of genitalia of other species.

Dr. H. T. Spieth visited this museum in 1939 and studied the types of the North American species described by Walker and Eaton and his results were published in 1940-41. References are given to these and to other published type-designations

and in the case of types not in the British Museum, an indication is given of their known or presumed location.

In conclusion I should like to express my thanks to the various workers who have answered my enquiries as to the location of types stated to be in their museums.

Family SIPHLONURIDAE

Ameletus dissitus Eaton, 1885, p. 210, pl. 44, fig. 22.

LECTOTYPE ♂. Designated by Spieth, 1941, p. 91. Male genitalia re-figured by McDunnough, 1929, p. 176, fig. 11.

Ameletus exquisitus Eaton, 1885, p. 212, pl. 44, fig. 24.

LECTOTYPE ♂. Designated by Spieth, 1941, p. 91, fig. 8.

Ameletus inopinatus Eaton, 1887, p. 307, pl. 65, fig. 14.

LECTOTYPE ♀. Schwarzwald, Feldbergsee, 4,000–5,000 ft., 29.vii.1885. B.M. 1938–674. LECTOALLOTYPE ♂. Lac de Retourna, Vosges, 23.vii.1883. B.M. 1938–674. Male genitalia re-figured by Kimmins, 1942a, p. 43, fig. 24. The female has been selected as the lectotype because Eaton's description is based upon that sex and its locality is listed first.

Ameletus perscitus Eaton. See *Ameletopsis*.

Ameletus subnotatus Eaton, 1885, p. 211, pl. 64, fig. 23.

LECTOTYPE ♂. Designated by Spieth, 1941, p. 92, fig. 7. LECTOALLOTYPE ♀. Colorado. B.M. 1938–674. *Ameletus subnotatus* Etn., det. A. E. Eaton.

Ameletopsis perscitus (Eaton), 1899, p. 291 (as *Ameletus*).

HOLOTYPE ♀. No. 26. Wellington, Hudson. *Ameletus perscitus*, sp. nov., in Eaton's writing. B.M. 1938–674.

Chirotonetes intermedius Eaton. See *Isonychia*.

Chirotonetes ornatus Eaton. See *Nesameletus*.

Dipteromimus tipuliformis McLachlan, 1875, p. 170.

HOLOTYPE ♂ in Leiden Museum.

Metamoniuss anceps Eaton, 1885, p. 209, pl. 20, fig. 34b.

(Text-fig. 1)

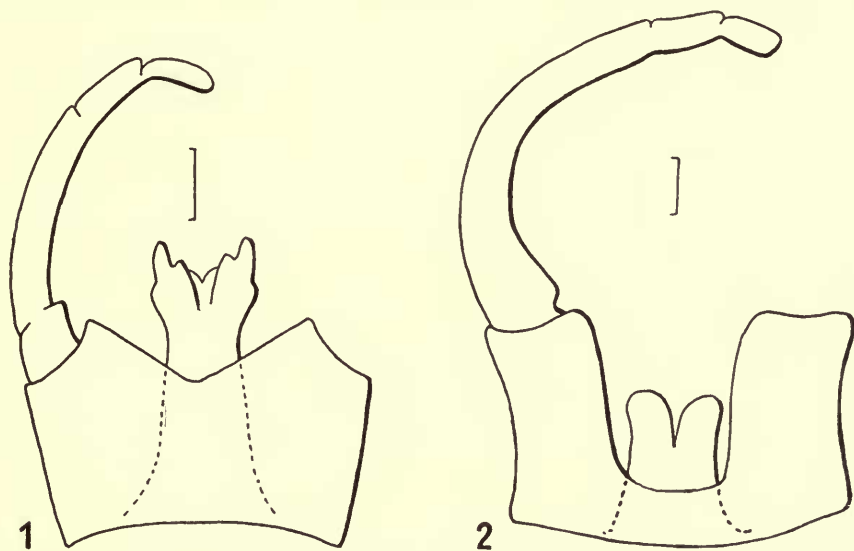
LECTOTYPE ♂. Chili, Reed. B.M. 1938–674. *Metamoniuss anceps* Etn., det. A. E. Eaton. The female imago has been described by Demoulin, 1955, p. 2 and the ALLOTYPE should therefore be selected from one of the examples in the Institut Royal des Sciences naturelles de Belgique.

Nesameletus ornatus (Eaton), 1883, pl. 19, fig. 33c; 1885, p. 208; 1888, p. 321 (as ? *Chirotonetes*).

The types of this species, from Christchurch, New Zealand, collected by Wakefield, have not been traced in the McLachlan collection. A comment by Eaton, 1888, p.

321, " Described and illustrated by me in 1876 after specimens at that time in the M'Lachlan Mus.", suggests that even in 1888 there was some doubt whether the original specimens were still in existence. In 1899, p. 291, Eaton again refers to this species, giving as additional locality, " Wellington (Hudson, no. 42) ", and three examples bearing this number have been found in the McLachlan collection, one female imago, one male and one female subimagines.

It is proposed therefore to designate the female imago from Wellington as NEOTYPE of *Nesameletus ornatus* (Eaton). It bears the following labels, No. 42. Wellington,



FIGS. 1-2. ♂ Genitalia, ventral, of 1, *Metamonius anceps* Eaton, paratype; 2, *Oniscigaster wakefieldi* McLachlan, example from Wakefield collection. (Scale = 0.2 mm.)

Hudson. B.M. 1938-674. *Ameletus ornatus* Etn., det. A. E. Eaton. This neotype is located in the British Museum (Nat. Hist.).

Oniscigaster distans Eaton, 1899, p. 293, pl. 10, figs. 6b, c.

LECTOTYPE ♀. No. 34. Wainuiomata R., N.Z., Hudson. *Oniscigaster distans* sp. nov., in Eaton's writing. B.M. 1938-674. There are also a paratype female (No. 34b) and a paratype male subimago (No. 34). The paratype female is smaller than the lectotype.

Oniscigaster intermedius Eaton, 1899, p. 292, pl. 10, fig. 6a.

HOLOTYPE ♀. No. 34a. Mt. Arthur, N.Z., Hudson. *Oniscigaster intermedius* Etn., in McLachlan's writing. B.M. 1938-674. It may be pointed out that in the original description the locality was erroneously printed as M'Arthur.

Oniscigaster wakefieldi McLachlan, 1873, p. 110; 1874, p. 140.

(Text-fig. 2)

LECTOTYPE ♀. McL. type-label (pink). No. 20. Christchurch, N.Z., Wakefield. *Oniscigaster wakefieldi* McL., in McLachlan's writing. B.M. 1938-674.

Siphonurus aestivalis (Eaton), 1903, p. 30 (as *Siphylurus*).

(Text-fig. 3)

LECTOTYPE ♂. McL. type-label (pink). *Sorüm, 10.viii.02* (on round label), in Eaton's writing. *Siphylurus aestivalis*, Eaton's writing. B.M. 1938-674. *Siphylurus aestivalis* Etn., det. A. E. Eaton. LECTOALLOTYPE ♀. Locality label as above. B.M. 1938-674. *Siphylurus aestivalis* Etn., det. A. E. Eaton. New figures are given of the genitalia, drawn from a paratype male.

Siphonurus annulatus (Walker), 1853, p. 567 (as *Baëtis*).

HOLOTYPE ♂. Discussed by Spieth, 1940, p. 332. Male genitalia figured by Traver, 1935, p. 464, fig. 123. This species is now considered a synonym of *Siphonurus alternatus* (Say).

Siphonurus armatus Eaton, 1870, p. 7.

LECTOTYPE ♂. Kerry: lakes of Killarney, 1861, P. Bouchard. McLachlan's register number, 2/62. *Siphylurus armatus* Etn., in McLachlan's writing. B.M. 1938-674. The type is in rather poor condition, legs almost entirely missing, genitalia mounted as a preparation, attached to the pin. Male genitalia figured by Kimmins, 1942a, p. 42, fig. 23A.

Siphonurus binotatus (Eaton), 1892, p. 302 (as *Siphylurus*).

(Text-fig. 4)

LECTOTYPE ♂. McL. type-label (pink). Japan, Pryer. *Siphylurus binotatus* Etn. in McLachlan's writing. B.M. 1938-674. LECTOALLOTYPE ♀. Labels as for male. The apex of the abdomen of the male has been cleared in caustic potash solution and preserved in a small tube of glycerine. Uéno, 1931, p. 206, has given a figure of the male genitalia of this species, but in his specimen the penis-lobes appear to have been distorted or damaged and the projection at the base of the forceps is too acute. I am therefore offering new figures, made from the lectotype male.

Siphonurus lacustris Eaton, 1870, p. 7.

HOLOTYPE ♂. Wales, Llyn Llydaw, vii. 1868. *Siphylurus lacustris* ♂. This specimen is preserved in a glycerine-alcohol mixture and is much discoloured. One penis-lobe has been mounted as a microscope preparation. The foregoing data are in Eaton's writing on the cork of the tube. Male genitalia figured by Kimmins, 1942a, p. 41, fig. 22.

Siphonurus linnaeanus Eaton, 1871, p. 127, pl. 6, figs. 3, 3a.

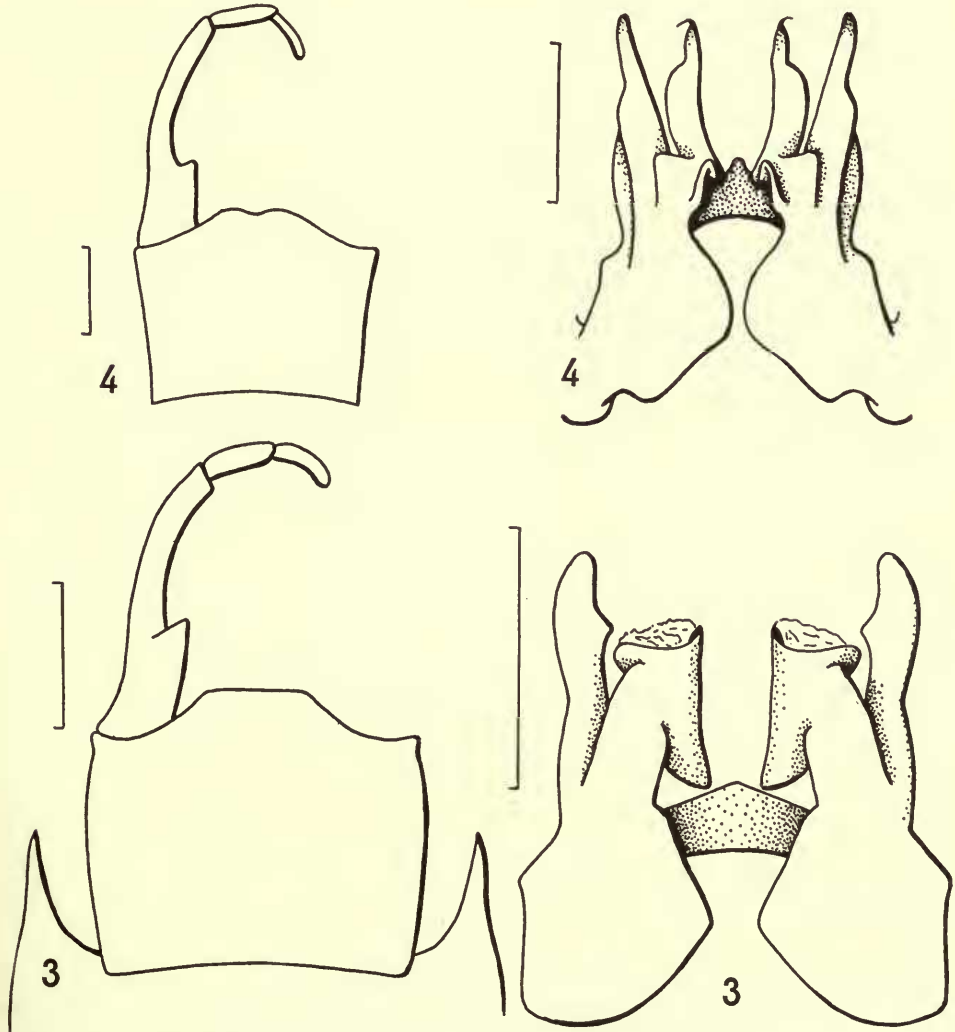
HOLOTYPE ♂ in Linnaean collection, Linnean Society, London. Male genitalia figured by Kimmins, 1942a, p. 42, fig. 23L.

Siphonurus mirus (Eaton), 1885, p. 221 (as *Siphlurus*).

HOLOTYPE ♀ in Mus. comp. Zool. Cambridge, Mass., U.S.A.

Siphonurus occidentalis (Eaton), 1888, p. 218, pl. 64, fig. 62 (as *Siphlurus*).

LECTOTYPE ♂. Designated by Spieth, 1941, p. 92. LECTOALLOTYPE ♀. Colorado. B.M. 1938-674. *Siphlurus occidentalis* Etn., det. A. E. Eaton. Male genitalia figured by Traver, 1935, p. 464, fig. 122.



FIGS. 3-4. ♂ Genitalia, ventral (with penis-lobes more enlarged) of 3, *Siphonurus aestivalis* (Eaton), paratype; 4, *Siphonurus binotatus* (Eaton), type. (Scale = 0.5 mm.)

Siphonurus typicus (Eaton), 1885, p. 222 (as *Siphururus*).

LECTOTYPE ♂. Designated by Spieth, 1941, p. 93. LECTOALLOTYPE ♀. Denham, Mass. B.M. 1938-674. *Siphururus typicus* Etn., det. A. E. Eaton. Male genitalia figured by Traver, 1935, p. 464, fig. 122 (as *berenice*).

Family ISONYCHIIDAE

Coloburiscus haleuticus (Eaton), 1871, p. 133, pl. 7, figs. 7, 7a.

HOLOTYPE ♂ in National Museum of Victoria, Melbourne (Nat. Mus. Type Registration No. 471). Mr. A. Neboiss kindly supplied me with this information and writes that it "is in quite good condition, genitalia appear to be perfect."

Coloburiscus humeralis (Walker), 1853, p. 552 (as *Palingenia*).

The HOLOTYPE is a female, lacking one fore wing.

Coloburiscus remotus (Walker), 1853, p. 564 (as *Baëtis*).

The TYPE is missing in the British Museum (Nat. Hist.). Eaton, 1871, 1885, placed this species in the synonymy of *Coloburiscus humeralis* (Walker) and one presumes that he may therefore at some time have examined the type. On the other hand, our Departmental copy of Walker's list, 1853, has been annotated in Eaton's handwriting and against *Baëtis remota* is the comment "Unrepresented".

Isonychia bicolor (Walker), 1853, p. 552 (as *Palingenia*).

HOLOTYPE is a female subimago, which was studied by Spieth, 1940, p. 326.

Isonychia ignota (Walker), 1853, p. 571 (as *Baëtis*).

(Text-fig. 5)

HOLOTYPE ♂. No locality label. *Baëtis? ignota* Walker, Type, in Eaton's writing.

Isonychia intermedia (Eaton), 1885, p. 207 (as *Chirotonetes*).

HOLOTYPE ♂. Studied by Spieth, 1941, p. 93, fig. 2.

Isonychia manca Eaton, 1871, p. 134 (*partim*).

LECTOTYPE ♀. Designated by Spieth, 1941, pp. 93-94.

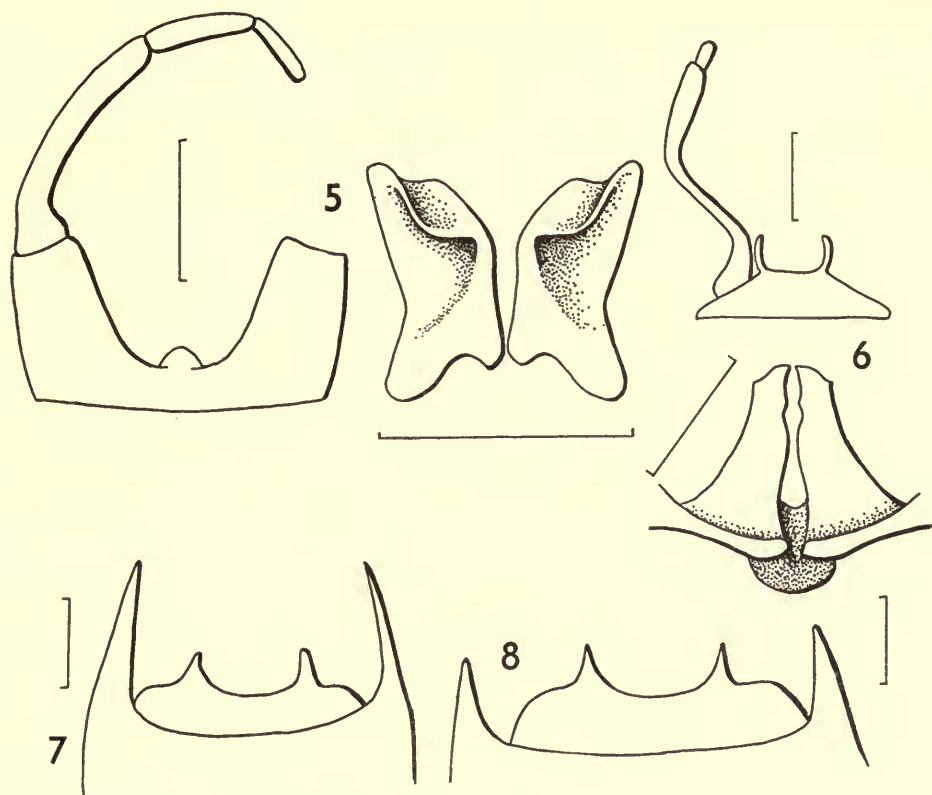
Family OLIGONEURIIDAE

Elassoneuria candida Eaton, 1913, p. 272.

(Text-fig. 8)

HOLOTYPE ♀. S. Nigeria, Ilesha, L. E. H. Humfrey. 1911-57. *Elassoneuria candida* sp. nov., in Eaton's writing. The right pair of wings was mounted in Canada balsam by Eaton. The apex of the abdomen has since been removed, cleared in caustic potash solution and preserved in glycerine. The ventral plate is produced

in two acute points, separated by a wide, rounded excision. This species has been synonymized with *Elassoneuria trimeniana* (McLachlan), but a comparison of the ventral plates of the two types shows slight differences, and in *trimeniana* the lateral processes of the sternite are about twice as long as the ventral plate. Examples of



FIGS. 5-8. 5-6, ♂ Genitalia, ventral (with penis-lobes, dorsal and more enlarged) of 5, *Isonychia ignota* (Walker), type; 6, *Noya pallipes* (Eaton), paratype; 7-8, ♀ ventral plate of 7, *Elassoneuria trimeniana* (McLachlan), type; 8, *Elassoneuria candida* Eaton, type. (Scale = 0.5 mm.)

candida from Uganda show some variation in the relative length of the lateral processes, but none are as long as in the type of *trimeniana*.

Elassoneuria trimeniana (McLachlan), 1868, p. 177 (as *Oligoneuria*).

(Text-fig. 7)

HOLOTYPE ♀. Natal, Umvoti District, Mapumulo Mission Station, 3rd March, 1867, at light. *Oligoneuria trimeniana* M'Lach. Type, in McLachlan's writing. B.M. 1938-674. The apex of the abdomen has been removed, cleared in caustic potash solution and is preserved in a small tube of glycerine.

Homoeoneuria salviniae Eaton, 1881, p. 192.

LECTOTYPE ♀. McL. type-label (purple). Dueñas, 4,950 [? feet]. Salvin. *Homoeoneuria salviniae* Etn., in McLachlan's writing. B.M. 1938-674. *Homoeoneuria salviniae* Etn., det. A. E. Eaton.

Lachlania lucida Eaton, 1883, p. 35, pl. 3, fig. 5.

HOLOTYPE ♂, ALLOTYPE ♀ probably in the Paris Museum. Two female paratypes in the British Museum (Nat. Hist.).

Noya pallipes (Eaton), 1883, p. 34 (as *Spaniophlebia*).

LECTOTYPE ♂. Ecuador. B.M. 1938-674. *Spaniophlebia pallipes* Etn., det. A. E. Eaton. Figures of the male genitalia have been made from the only male paratype still retaining an abdomen.

Oligoneuria dobbsi Eaton. See *Oligoneuriopsis*.***Oligoneuria trimeniana*** McLachlan. See *Elassoneuria*.***Oligoneuriopsis dobbsi*** (Eaton), 1912, p. 243 (as *Oligoneuria*).

(Text-figs. 9-10)

HOLOTYPE ♀. British East Africa, Sotik Post, Lumbwa District, $\frac{1}{2}$ mile from R. Nyangoria, 6,000 ft., 22.viii.1911. C. M. Dobbs. 1913-40. *Oligoneuria dobbsi* Etn. *Type*, in Eaton's writing.

In 1924, Ulmer (p. 31) transferred this species to *Oligoneuriella*, with which genus the venation agrees well. There is however in the British Museum (Nat. Hist.) a male which I believe to be conspecific with *dobbsi* Eaton, and this has four-segmented forceps, thus differing from *Oligoneuriella* and resembling *Oligoneuriopsis* Crass, to which genus I now transfer it. Whilst dealing with Eaton's type, it may be pointed out that the minute fork shown at the apex of M in Eaton's figure is incorrect, the supposed anterior branch being merely an accidental fold in the membrane of the wing.

ALLOTYPE ♂. Brit. E. Africa, Lumbwa District, Ainap Kororik, 10 miles from Kericho, about 6,500 ft., 7.vi.1915, C. M. Dobbs. 1915-280. Abdomen in glycerine, one pair of wings mounted on microscope slide.

Smaller and paler than holotype. Anterior leg fuscous as far as two basal tarsal segments, apex of tarsus creamy white. Median and posterior femora pale tawny, tibiae creamy white except at base, which is pale fuscous, tarsi whitish, two basal segments pale fuscous. Thorax light brown with whitish sutures. Abdomen pale fuscous, setae and forceps whitish.

Forceps-base short and broad, produced between the forceps in a short transverse lobe. Penis-lobes large, triangular, rather complex. In ventral view the outer margin, which is more sclerotized, is rather sinuous and there is a median claw-shaped process directed inwards. Apex of penis-lobe bent inward and clavate, and from the end of it can be extruded a membranous structure, as shown on the

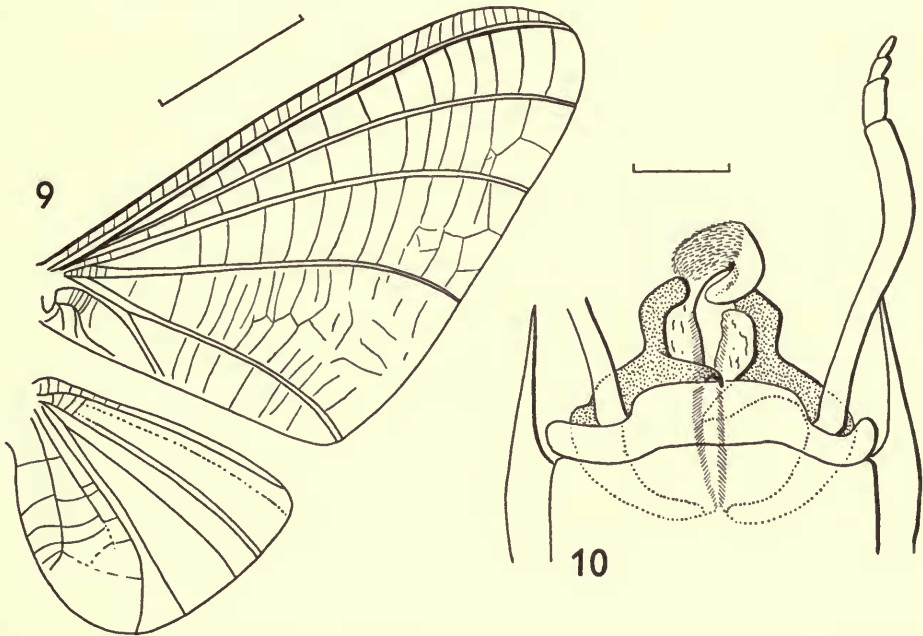
left side of the figure. Forceps four-segmented, very lightly sclerotized, basal segment more than three times as long as remaining segments together.

Length of fore wing, 18 mm.

Spaniophlebia pallipes Eaton. See *Noya*.

Spaniophlebia trailiae Eaton, 1881, p. 191.

LECTOTYPE ♂. McL. type-label (purple). Saõ Paulo, 26.xi.74, light. *Spaniophlebia trailiae* Etn., in McLachlan's writing. B.M. 1938-674. Two examples (date



FIGS. 9-10. *Oligoneuriopsis dobbsi* (Eaton), ♂ allotype. 9, wings (scale = 5 mm.); 10, genitalia, ventral (scale = 0.5 mm.).

as above) of the type series remained in the McLachlan collection. Both had been hollowed out by the attacks of cabinet pests and one had lost the apex of the abdomen completely. The other, designated LECTOTYPE, had had most of the genitalia devoured, and as the apex of the abdomen was very fragile and loose, it has been removed and placed in a small tube of glycerine for greater safety.

Family HEPTAGENIIDAE

Atopopus tarsalis Eaton, 1881, p. 22.

(Text-fig. 11)

LECTOTYPE ♂. Labuan. B.M. 1938-674. *Atopopus tarsalis* Etn., det. A. E. Eaton. The lectotype lacks its setae and the paratype its head.

Bleptus fasciatus Eaton, 1885, p. 243, pl. 65, fig. 1.

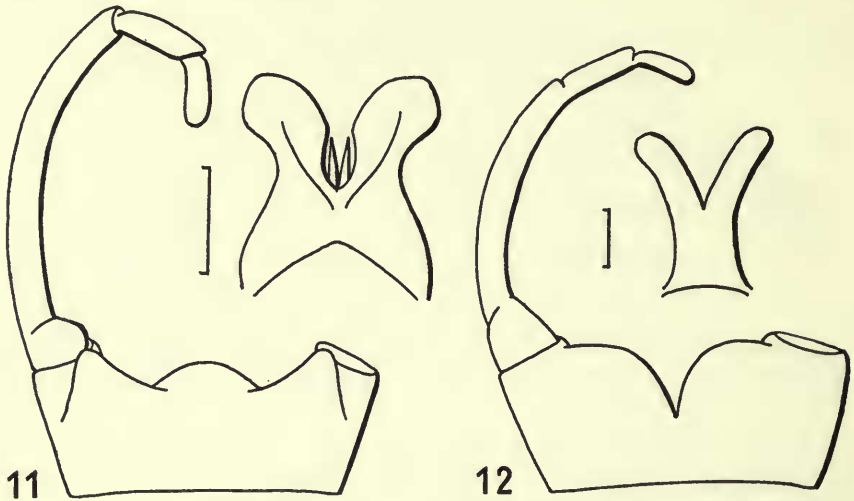
(Text-fig. 12)

HOLOTYPE ♂. Japan, Yagohara, 29. vii. 1881, G. Lewis. B.M. 1938-674. *Bleptus fasciatus* Etn., det. A. E. Eaton.

Cinygma geminatum Eaton. See *Ironodes*.

Cinygma integrum Eaton, 1885, p. 248, pl. 65, fig. 4.

LECTOTYPE ♂. Designated by Spieth, 1941, p. 88. Male genitalia figured by McDunnough, 1926, pl. 3, fig. 10. Re-examination of the preparation of the male



FIGS. 11-12. ♂ Genitalia, ventral, of 11, *Atopopus tarsalis* Eaton, type; 12, *Bleptus fasciatus* Eaton, type. (Scale = 0.2 mm.)

paratype referred to by Spieth confirms that there are small teeth on the lobes of the penis.

Cinygma mimus Eaton. See *Cinygmula*.

Cinygma par Eaton. See *Cinygmula*.

Cinygmula mimus (Eaton), 1885, p. 249 (as *Cinygma*).

LECTOTYPE ♂. Designated by Spieth, 1941, p. 89. Male genitalia figured by McDunnough, 1924, pl. 3, fig. 7.

Cinygmula par (Eaton), 1885, p. 249, pl. 65, fig. 5 (as *Cinygma*).

LECTOTYPE ♂. Designated by Spieth, 1941, p. 89, fig. 4.

Compsoeuria spectabilis Eaton, 1881, p. 23.

TYPE not traced in Leiden Museum (Lieftinck, i. 1., x. 1958).

Ecdyurus affinis Eaton. See *Heptagenia*.

Ecdyurus spp. See *Ecdyonurus*.

Ecdyonurus annulifer (Walker), 1860, p. 199, (as *Palingenia*).

HOLOTYPE ♀. Hindostan. Saunders, 68-3. *annulifera* Wlk.

Ecdyonurus helveticus (Eaton), 1883, pl. 24, fig. 46a; 1887, p. 282 (as *Ecdyurus*).

LECTOTYPE ♂. Designated by Kimmins, 1942, p. 125. Male genitalia figured by Kimmins, 1958, p. 230, figs. 10-12.

Ecdyonurus insignis (Eaton), 1870, p. 7 (as *Heptagenia*).

I have found no imagines of this species labelled "*insignis*" in the McLachlan collection which bore dates earlier than 1870. There is one subimago in the British Museum (Nat. Hist.), which would qualify as regards date and locality, were it not for the fact that the original description makes no mention of the subimaginal stage. This specimen is in glycerine and alcohol and the cork of the tube is labelled "*Heptagenia insignis* ♂ *Sub.*, Reading, vi.68. *B. montana* Hg. Syn."

There are, however, two pinned examples in the McLachlan collection, one of which might be considered in the search for the type. This is a male imago which was in his British collection. It bears no locality data, only a small, round label inscribed (probably by McLachlan) "*montan. Eaton*". It seems likely that he received examples from Eaton determined as *Baëtis montana* Hagen (*nec* Pictet), which were part of the series subsequently described as *Heptagenia insignis* Eaton (with *Baëtis montana* Hagen as synonym).

On these grounds I have decided to designate this McLachlan pinned example as LECTOTYPE of *Heptagenia insignis* Eaton.

LECTOTYPE ♂. *montan. Eaton* in McLachlan's writing?. B.M. 1938-674.

The other possibility is a female imago from Burton-on-Trent district (the Trent being one of the rivers mentioned in the original description) and I have selected this example as the ALLOTYPE.

LECTOALLOTYPE ♀. Staffs: Neighbourhood of Burton-on-Trent, mid.-Aug., 1869. R. McLachlan. B.M. 1938-674. Male genitalia figured by Kimmins, 1942b, p. 502, fig. 8.

Ecdyonurus italicus (Eaton), 1883, pl. 24, fig. 46c (as *Ecdyurus*).

LECTOTYPE ♂. Designated by Kimmins, 1942, p. 125. Male genitalia figured by Kimmins, 1958, p. 230, figs. 13-15. This species is now considered a synonym of *Ecdyonurus helveticus* (Eaton).

Ecdyonurus quaesitor (Eaton), 1883, pl. 24, fig. 46b; 1887, p. 286 (as variety of *Ecdyurus venosus* (Fabricius)).

I have been unable to trace any examples of this insect in McLachlan's collection, where most of Eaton's material was deposited. All I could discover was a large male *E. dispar* from the Pyrénées Orientales, over a label in Eaton's writing "*Ecdyurus longicauda* v. *quaesitor*". Apart from the fact that the specimen is not

from the type locality, the pattern of the abdomen does not agree with the description, the lateral abdominal stripes being weak and obscure. The only Apennine specimens of *Ecdyonurus* in the McLachlan collection at the time of its purchase by the British Museum (Nat. Hist.) were over the label *forcipula* Pictet and were a mixture of that species and *E. helveticus* (Eaton). The TYPE must therefore be presumed lost.

Ecdyonurus zelleri (Eaton), 1883, p. 239; 1887, p. 286 (as *Ecdyurus*).

LECTOTYPE ♂. Designated by Kimmins, 1942, p. 219. Male genitalia figured by Kimmins, 1958, p. 232, figs. 20-23.

The genus **EPEORUS**

Of the four European species described by Eaton, *E. alpicola* is clearly distinct from the other three in the form of the male genitalia. The penis-lobes are much less outspread and are only a little wider than the stem of the penis. In ventral view the membranous central area between the sclerites is much wider, and apically does not diverge in narrow arms. The other three species, *assimilis*, *torrentium* and *geminus* are closely related in genital structure. In *assimilis*, there is generally a small projection on the inner margin of the forceps towards the base and the penis-lobes are perhaps stouter and less out-turned. In *torrentium*, there is usually a small tooth on the apical margin of the forceps-base, near the base of each forceps. The penis-lobes are more outspread and narrower than in *assimilis*. In *geminus* (= *sylvicola* Ed.-Pictet), the penis-lobes are still narrower than in *torrentium*, there may be a small process toward the base of the forceps but none on the forceps-base itself.

It will be seen from the figures that these differences are not very evident and tend to intergrade and it may be necessary in the future to consider all three as synonymous or as subspecies. Further study in the field and of larvae is needed to settle these points.

Epeorus alpicola (Eaton), 1871, p. 148, pl. 6, fig. 19 (as *Heptagenia*).

(Text-fig. 13)

HOLOTYPE ♂ (in fluid). France, Les Contamines, 24.vii.1870. A. E. Eaton. 1871-II.

Epeorus assimilis Eaton, 1886, p. 239.

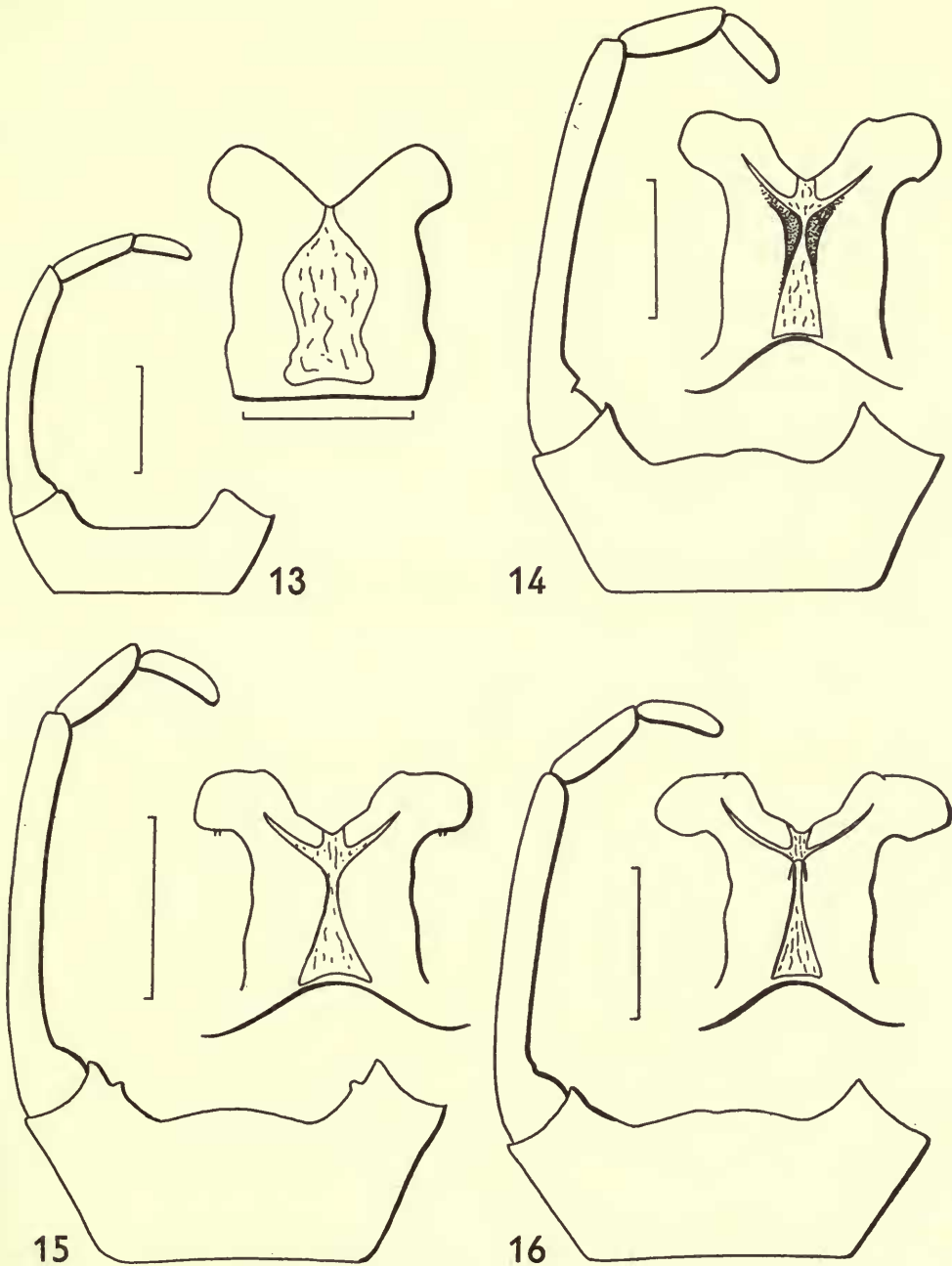
(Text-fig. 14)

LECTOTYPE ♂. Schwarzwald, 30.vii.1885. B.M. 1938-674. *Epeorus assimilis* Etn., det. A. E. Eaton.

Epeorus geminus Eaton, 1885, p. 238.

(Text-fig. 16)

LECTOTYPE ♂. Estrella, 4,242 ft., 7.vi.1880. Eaton, Portugal, 1880. B.M. 1938-674. *Epeorus geminus* Etn., det. A. E. Eaton. This species is now considered a synonym of *Epeorus sylvicola* (Ed.-Pictet).



FIGS. 13-16. ♂ Genitalia, ventral, of *Epeorus* spp. 13, *E. alpicola* (Eaton), type; 14, *E. assimilis* Eaton, paratype; 15, *E. torrentium* Eaton, paratype; 16, *E. geminus* Eaton, paratype. (Scale = 0.5 mm.)

Epeorus psi Eaton, 1885, p. 242.

HOLOTYPE ♂. In spirit, Mus. comp. Zool. Cambridge, Mass.

Epeorus torrentium Eaton, 1881, p. 26.

(Text-fig. 15)

LECTOTYPE ♂. France, Tarascon, 25.viii.1880. B.M. 1938-674. *Epeorus torrentium* Etn., det. A. E. Eaton.

Heptagenia affinis (Eaton), 1883, pl. 24, fig. 46a; 1887, p. 293 (as *Ecdyurus*).

LECTOTYPE ♂. Netherlands, Eaton, 1879. Arnhem, 26.viii.1879. Reuter, No. 2. B.M. 1938-674. *Ecdyurus affinis* Etn., det. A. E. Eaton.

Heptagenia alpicola Eaton. See *Epeorus*.

Heptagenia borealis Eaton. See *Metretopus* (Ametropodidae).

Heptagenia cupulata Eaton. See *Paegniodes*.

Heptagenia elegantula (Eaton), 1885, p. 253 (as *Rhithrogena*).

HOLOTYPE not traced but probably in Mus. comp. Zool. Cambridge, Mass. (W. L. Brown, Jr., i. 1., 23.x.1958). Two paratypes from Arizona in British Museum (Nat. Hist.).

Heptagenia gallica Eaton, 1883, pl. 23, fig. 45; 1885, p. 272.

LECTOTYPE ♂. Toulouse, A. E. Eaton. 3.ix.80. B.M. 1938-674. *Heptagenia gallica* Etn., det. A. E. Eaton. LECTOALLOTYPE ♀. Data as above except date, 17.viii.80. This species is now considered a synonym of *Heptagenia caerulans* Rostock.

Heptagenia insignis Eaton. See *Ecdyonurus*.

Heptagenia manifesta (Eaton), 1885, p. 253 (as *Rhithrogena*).

This name was proposed by Eaton for *Baëtis debilis* Walsh, 1862, nec Walker, 1853. Walsh's collection was destroyed by fire in Chicago in 1871 and the species has not since been recognized.

Heptagenia nivata Eaton. See *Rhithrogena*.

Heptagenia volitans Eaton, 1870, p. 7.

LECTOTYPE ♂. Of the original series I have been able to trace only one male, presented to the British Museum (Nat. Hist.) in 1868. This is preserved in glycerine and is labelled as follows: *Reading, 23.v.68. 68-124. Heptagenia volitans*. Male genitalia figured by Kimmins 1942a, p. 46, fig. 27F (as *H. fuscogrisea*) with which species it is now considered synonymous.

Iron longimanus Eaton, 1883, pls. 23-24, fig. 44; 1885, p. 245; 1887, pl. 65, fig. 2.

LECTOTYPE ♂. Designated by Spieth, 1941, p. 88. Male genitalia figured by Traver, 1935, p. 399, fig. 105.

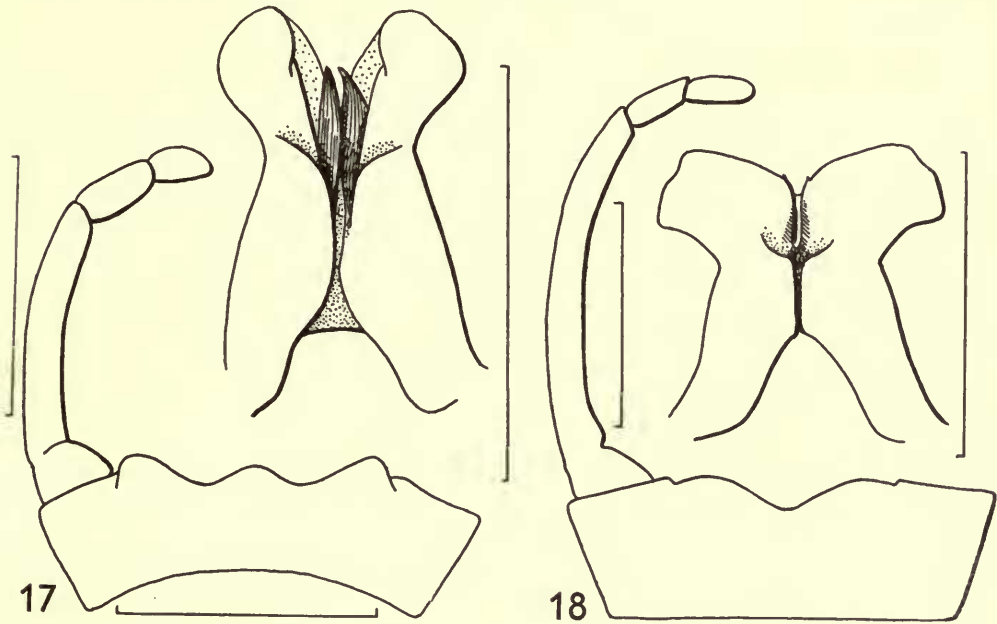
Iron nitidus Eaton. See *Ironodes*.

Iron vitrea (Walker), 1853, p. 555 (as *Palingenia*).

HOLOTYPE ♀ (subimago). Discussed by Spieth, 1940, p. 330.

Ironodes geminatus (Eaton), 1885, p. 250 (as *Cinygma*).

LECTOTYPE ♀. Designated by Spieth, 1941, p. 90.



FIGS. 17-18. ♂ Genitalia, ventral (with penis-lobes more enlarged) of *Heptagenia* spp. 17, *H. affinis* (Eaton), paratype; 18, *H. gallica* Eaton, paratype. (Scale = 0.5 mm.)

Ironodes nitidus (Eaton), 1885, p. 246, pl. 65, fig. 3 (as *Iron*).

LECTOTYPE ♂. Designated by Spieth, 1941, p. 90, fig. 3.

Paegniodes cupulatus (Eaton), 1871, p. 138, pl. 6, figs. 14, 14a (as *Heptagenia*).

LECTOTYPE ♂. N. China, 54-8. *Heptagenia cupulata* Eaton (*Type*). LECTO-ALLOTYPE ♀. N. China, 54-42. *Heptagenia cupulata* Eaton (*Type*). The lectotype has one hind wing detached and the allotype lacks head and prothorax.

Rhithrogena alpestris Eaton, 1885, p. 255, pl. 24, fig. 43a.

(Text-fig. 25)

LECTOTYPE ♂. Savoy, Eaton, 1879. Dranse de Biot, Charbonnière, 4,300-4,800 ft., 2.ix.1879. B.M. 1938-674. *Rhithrogena alpestris* Etn., det. A. E. Eaton.

Rhithrogena elegantula Eaton. See *Heptagenia*.

Rhithrogena fusca (Walker), 1853, p. 568 (as *Baëtis*). See *Rh. jejuna* Eaton.

Rhithrogena germanica Eaton, 1885, p. 260.

HOLOTYPE ♂ probably in the Berne Museum.

Rhithrogena hageni Eaton, 1885, p. 253 (n.n. for *Heptagenia brunnea* Hagen, ♂).

HOLOTYPE of *Heptagenia brunnea* Hagen in Mus. comp. Zool. Cambridge, Mass.

Rhithrogena hybrida Eaton; 1885, p. 256.

(Text-fig. 21)

LECTOTYPE ♂. Savoy, Eaton, 1879. Dranse de Biot, Charbonnière, 4,700 ft., 12.viii.1879. B.M. 1938-674. *Rhithrogena hybrida* Etn., det. A. E. Eaton. The male genitalia of this species differ considerably from the figure given by Schoenemund, 1930, p. 30, fig. 41, particularly in the form of the penis-lobes. The general structure agrees very closely with that of *Rh. nivata* (Eaton). From the limited material available, *R. hybrida* appears to be smaller and may be considered as a subspecies of *R. nivata*.

Rhithrogena jejuna Eaton, 1885, p. 252.

LECTOTYPE ♂. Designated by Spieth, 1940, p. 334. LECTOALLOTYPE ♀. Hudson's Bay, 44-17. *Baëtis fusca* Walker (*Type*), in Eaton's writing.

Rhithrogena manifesta Eaton. See *Heptagenia*.

Rhithrogena nivata (Eaton), 1871, p. 137, pl. 6, fig. 10 (as *Heptagenia*).

LECTOTYPE ♂ (in fluid). Val de Triente, Barberine, 3,700 ft., 17.viii.1870. A. E. Eaton. *Rhithrogena nivata* Etn *Type*, in Eaton's writing. B.M. 1938-674.

Stenonema canadense (Walker), 1853, p. 569 (as *Baëtis*).

LECTOTYPE ♂. Designated by Spieth, 1940, p. 333. Male genitalia figured by Traver, 1935, p. 304, fig. 91.

Stenonema luridipennis (Walker, *nec* Burmeister), 1853, p. 563 (as *Baëtis*).

Spieth, 1940, p. 337, has identified Walker's specimen from St. Martin's Falls, Albany River, Hudson's Bay as *Stenonema fusca* Clemens.

Stenonema tessellatum (Walker), 1853, p. 566 (as *Baëtis*).

HOLOTYPE ♀ (subimago). Placed by Spieth, 1940, p. 336, as a synonym of *Stenonema vicarium* (Walker).

Stenonema vicarium (Walker), 1853, p. 565 (as *Baëtis*).

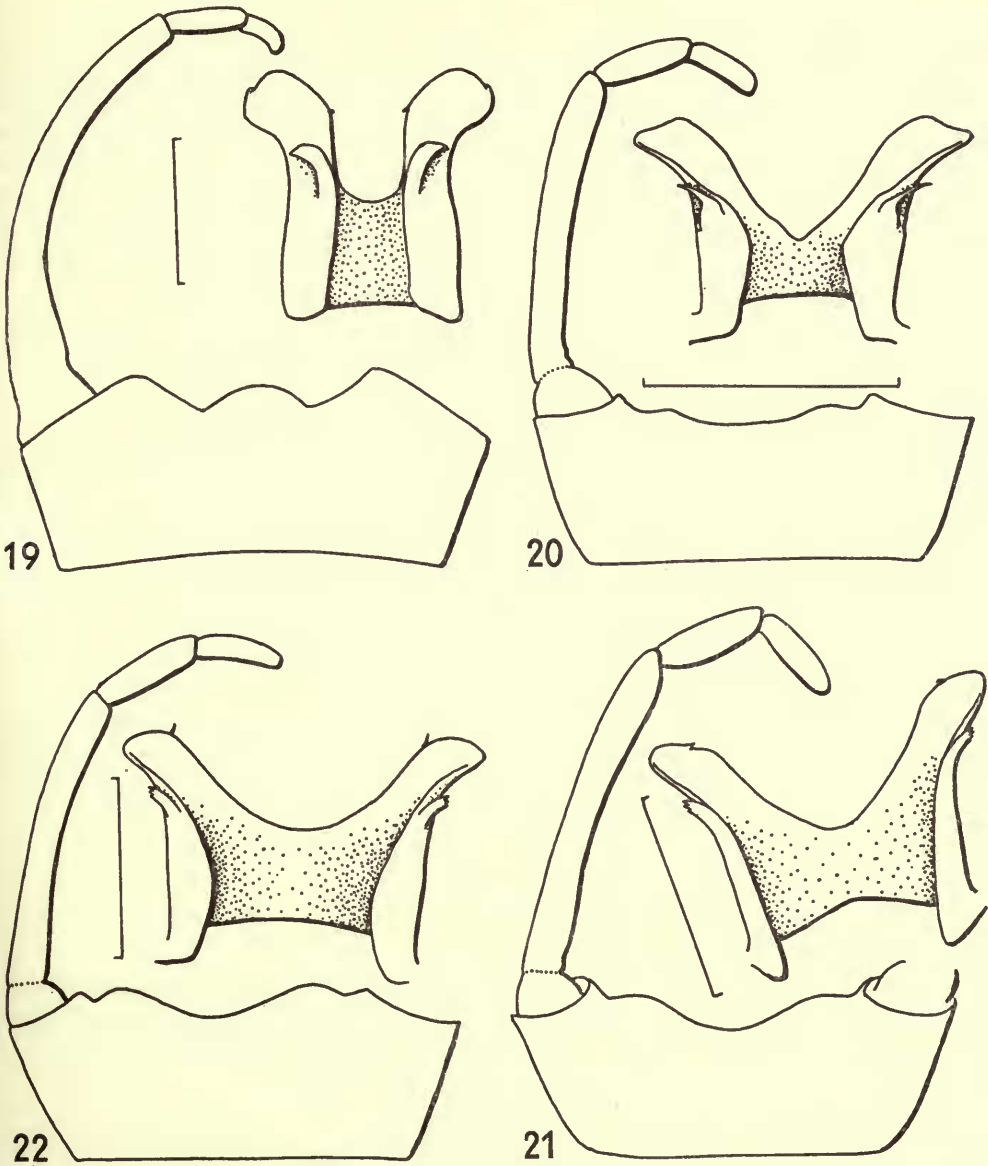
HOLOTYPE ♂. Discussed by Spieth, 1940, p. 336.

Thalerosphyrus torridus (Walker), 1853, p. 571 (as *Baëtis*).

HOLOTYPE ♀. Phil. Is. 45-49. *Baëtis torridus* Walker (*Type*), in Eaton's writing. The greater part of the wings are now missing, as are the cerci and hind legs.

Thalerosphyrus determinatus (Walker), 1853, p. 567 (as *Baëtis*).

HOLOTYPE ♂. Java. 46-108. *Baëtis determinatus* Walker (*Type*), in Eaton's writing. Most of the abdomen is missing and only one leg now remains.



FIGS. 19-22. ♂ Genitalia, ventral, of *Paegniodes* and *Rhithrogena* spp. 19, *Paegniodes cupulatus* (Eaton), type; 20, *Rhithrogena alpestris* Eaton, paratype; 21, *R. hybrida* Eaton, paratype; 22, *R. nivata* (Eaton), type. (Scale = 0.5 mm.)

Family AMETROPODIDAE

Metretopus borealis (Eaton), 1871, p. 137 (as *Heptagenia*).

HOLOTYPE ♂ in Dale collection, University Museum, Oxford.

Metretopus norvegicus Eaton, 1901, p. 254.

The collection, made by Herr E. Strand, from which this species was described, could not be found in the Oslo Museum (Brekke, 1938, p. 60, footnote). It is possible that it may be in either the Zoological Museum, Berlin or in the Entomological Institute, Dahlem. There were no examples of this species in the McLachlan collection, but in the British Museum (Nat. Hist.), there is a microscope slide of the male genitalia, cerci and legs from one of the type series. As this preparation was made by Eaton and was undoubtedly used by him in making his description, I propose to designate it as the LECTOTYPE of *M. norvegicus* Eaton.

LECTOTYPE ♂. Norway, Aal, ix. 1900, E. Strand. *Metretopus norvegicus* ♂ im. Microscope preparation of legs, genitalia and cerci.

M. norvegicus is now considered a synonym of *M. borealis* (Eaton).

Siphloplecton basalis Walker), 1853, p. 565 (as *Baëtis*).

HOLOTYPE ♂. Discussed by Spieth, 1940, p. 332. Male genitalia figured by Traver, 1935, p. 441, fig. 115.

Family BAËTIDAE

Baëtis albititta Walker. See *Hexagenia* (Ephemeridae).

Baëtis amnicus Eaton, 1871, p. 117, pl. 5, figs. 24, 24a.

(Text-fig. 23)

LECTOTYPE ♂. Barberine, 17. vii. 70. A. E. Eaton. *Baëtis amnicus* Etn., (Type). 1871-11. (In fluid collection.) This species is now considered a synonym of *B. alpinus* Pictet.

Baëtis angulatus Walker. See *Hexagenia* (Ephemeridae).

Baëtis annulatus Walker. See *Siphonurus*.

Baëtis atrebatinus Eaton, 1870, p. 4.

LECTOTYPE ♂ (Imago). In tube of glycerine, with ♂ subimago. Data on cork, in Eaton's writing, *Baëtis atrebatinus*. Reading, x. 19. 68. B.M. register No. 68-124.

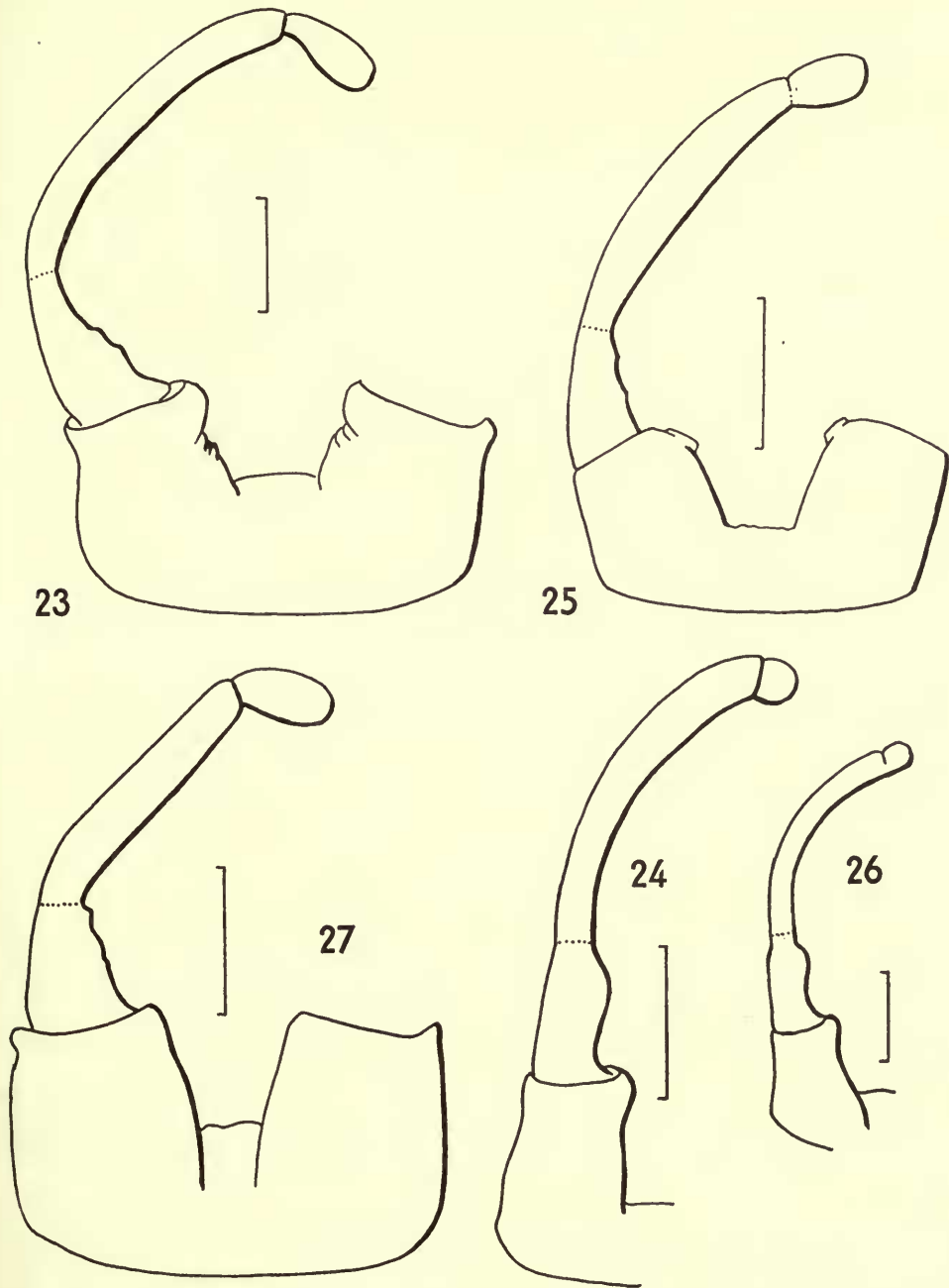
Baëtis basalis Walker. See *Siphloplecton* (Ametropodidae).

Baëtis bocagii Eaton, 1885, p. 162, pl. 64, fig. 13.

(Text-fig. 24)

HOLOTYPE ♂. Eaton, Portugal, 1880. Lisbon. B.M. 1938-674. *Baëtis bocagii*.

Eaton gives descriptions of the living subimago and male imago. There is in the McLachlan collection only the single type, which one presumes was bred from



FIGS. 23-27. ♂ Forceps, ventral, of *Baëtis* spp. 23, *B. amnicus* Eaton, type; 24, *B. bocagii* Eaton, type; 25, *B. finitimus* Eaton, type; 26, *B. gemellus* Eaton, type; 27, *B. nublularis* Eaton, example determined by Eaton. (Scale = 0.2 mm.)

the subimago. The male genitalia of the type appear to be identical with that of *Baëtis rhodani* (Pictet), there is little difference in the colouring as detailed by Eaton and I therefore transfer *bocagii* to the synonymy of *B. rhodani* (Pictet) (**Syn. nov.**).

Baëtis buceratus Eaton, 1870, p. 5.

I have been able to trace only one example referable to the type series, a male presented to the British Museum (Nat. Hist.) by Eaton in 1868.

LECTOTYPE ♂ (in glycerine). Data on cork, *Baëtis buceratus*. Reading. Label on tube, 68-124. Male clasper figured by Kimmins, 1942a, p. 34, fig. 15B.

Baëtis canadense Walker. See *Stenonema* (Heptageniidae).

Baëtis debilis Walker. See *Paraleptophlebia*.

Baëtis determinatus Walker. See *Thalerosphyrus* (Heptageniidae).

Baëtis feminalis Eaton, 1885, p. 171.

TYPES in Hagen collection, Mus. comp. Zool. Cambridge, Mass.

Baëtis finitimus Eaton, 1871, p. 113.

(Text-fig. 25)

LECTOTYPE ♂, LECTOALLOTYPE ♀ (in 2% formaldehyde solution). France, Les Contamines, 24.vii.70. A. E. Eaton. *Baëtis finitimus* Eaton (*Type*), ♂, ♀. 1871-11. This species is now considered a synonym of *B. melanonyx* Pictet.

Baëtis fusca Walker. See *Rhithrogena*.

Baëtis fuscata Walker. See *Ephemerella*.

Baëtis gemellus Eaton, 1885, p. 163.

(Text-fig. 26)

LECTOTYPE ♂. Helvetia, Eaton, 1879. Champéry, 4,000 ft., 13.viii.1879. B.M. 1938-674. *Baëtis gemellus* Etn., det. A. E. Eaton. I consider that this species should be placed in the synonymy of *B. rhodani* Pictet (**Syn. nov.**).

Baëtis hageni Eaton, 1885, p. 169 (n.n. for *Baëtis unicolor* (Hagen)).

TYPE of *Baëtis unicolor* Hagen probably in Mus. comp. Zool., Cambridge, Mass. Eaton proposed the name *hageni* under the impression that *Cloë unicolor* Hagen, 1861, was a homonym of *Cloëon unicolore* Curtis, 1834, but Hagen's name is generally used by American authors.

Baëtis ignota Walker. See *Isonychia*.

Baëtis invaria Walker. See *Ephemerella*.

Baëtis luridipennis Walker. See *Stenonema*.

Baëtis nubecularis Eaton, 1898, p. 265.

(Text-fig. 27)

HOLOTYPE ♂. Lac de Joux district, 1898, *nubecularis* Eaton, *Type*, in Eaton's writing. B.M. 1938-674.

Baëtis pictus Eaton. See *Callibaëtis*.

Baëtis remota Walker. See *Coloburiscus* (Isonychiidae).

Baëtis salvini Eaton, 1885, p. 170, pl. 16, fig. 29a.

LECTOTYPE ♂. Irazu, 6,000-7,000 ft., H. Rogers. B.M. 1938-674. *Baëtis salvini* Etn., det. A. E. Eaton. LECTOALLOTYPE ♀. Data as above. Male genitalia figured by Kimmins, 1934, p. 348, fig. 13. The types of this species were stated by Eaton to be in the Godman and Salvin collection, but they were not in that collection when it became the property of the B.M. (N.H.). They came to the Museum as part of the McLachlan collection. Possibly they were returned by Eaton to McLachlan in error.

Baëtis scambus Eaton, 1870, p. 3.

The TYPE of this species appears to be missing, unless a pair in the British Museum (Nat. Hist.) were wrongly dated by Eaton. His paper containing the original description was read before the Entomological Society of London on 3rd January, 1870 and the specimens are dated vi. 1870. They are from Ashbourne, the typical locality, and as there is no definite evidence that they were wrongly dated by Eaton, one cannot make them anything but topotypes.

TOPOTYPES ♂, ♀. *Ashbourne, vi. 1870. Baëtis scambus. 71-11.* Male claspers figured by Kimmins, 1942a, p. 35, fig. 17S.

Baëtis scita Walker. See *Atalophlebia*.

Baëtis taprobanes Walker. See *Atalophlebia*.

Baëtis tenax Eaton, 1870, p. 5.

The same circumstances apply as in the case of *B. scambus* Eaton.

TOPOTYPE ♂. *Ashbourne, v. 1870. Baëtis tenax* ♂. 1871-11. Male clasper figured by Kimmins, 1942a, p. 35, fig. 16T.

Baëtis tessellata Walker. See *Stenonema*.

Baëtis torridus Walker. See *Thalerosphyrus* (Heptageniidae).

Baëtis venustulus Eaton, 1885, p. 160, pl. 64, fig. 19.

LECTOTYPE ♂. Helvetia, Eaton, 1879. Geneva, Rhone, 1,220 ft., 25.viii.1879. B.M. 1938-674. *Baëtis venustulus* Etn., det. A. E. Eaton.

Baëtis vicaria Walker. See *Stenonema*.

Callibaetis hageni Eaton, 1883, p. 192, pl. 16, fig. 28a.

Dr. W. L. Brown, Jr., writes me that there is in the Mus. comp. Zool., Cambridge, Mass., a specimen which was seen by Eaton, but which is without a standard red type label.

Callibaëtis montanus Eaton, p. 196, pl. 16, fig. 28d.

LECTOTYPE ♀. Aceytuno, 5,100 ft., B.M. 1938-674. *Callibaëtis montanus* Etn., det. A. E. Eaton.

Callibaëtis pictus (Eaton), 1871, p. 122, pl. 5, fig. 27 (as *Baëtis*).

LECTOTYPE ♂. Designated by Spieth, 1941, p. 98. LECTOALLOTYPE ♀. 17/7. Bosque Co., Texas, Belfrage. *Baëtis pictus* Etn. B.M. 1938-674.

Centroptilum algiricum Eaton, 1899a, p. 4.

LECTOTYPE ♂. Mirabeau, 5.xi.92, ♂. B.M. 1938-674. *Centroptilum algiricum* Etn., ♂ *Type*, D. E. Kimmins det. 1950. LECTOALLOTYPE ♀. Tissadourt, 4.xi.92, ♀. B.M. 1938-674. *Centroptilum algiricum* Etn., ♀ *Allotype*, D. E. Kimmins det. 1950. The allotype ♀ lacks abdomen and left fore wing.

Centroptilum lacustre Eaton, 1885, p. 176.

(Text-fig. 28)

LECTOTYPE ♂. Pallanza, 18.vii.92. Eaton, 1892. B.M. 1938-674. *Centroptilum lacustre* Etn. LECTOALLOTYPE ♂. Details as above.

Centroptilum nemorale Eaton, 1885, p. 177.

(Text-fig. 29)

HOLOTYPE ♂. Apennino Pistoiese, Eaton, 1882. 26.vii.82. B.M. 1938-674. *Centroptilum nemorale* Etn.

Centroptilum pennulatum Eaton, 1870, p. 2.

LECTOTYPE ♂ (in glycerine). Data on cork, in Eaton's writing, *Baëtis penulata*. Reading, Grazley, Near 3 mile†, 18.x.68. 68-124. Male genitalia figured by Kimmins, 1942a, p. 37, fig. 19P.

Centroptilum poëyi Eaton, 1885, p. 179.

TYPE in Mus. comp. Zool. Cambridge, Mass.

Centroptilum pulchrum Eaton, 1885, p. 177.

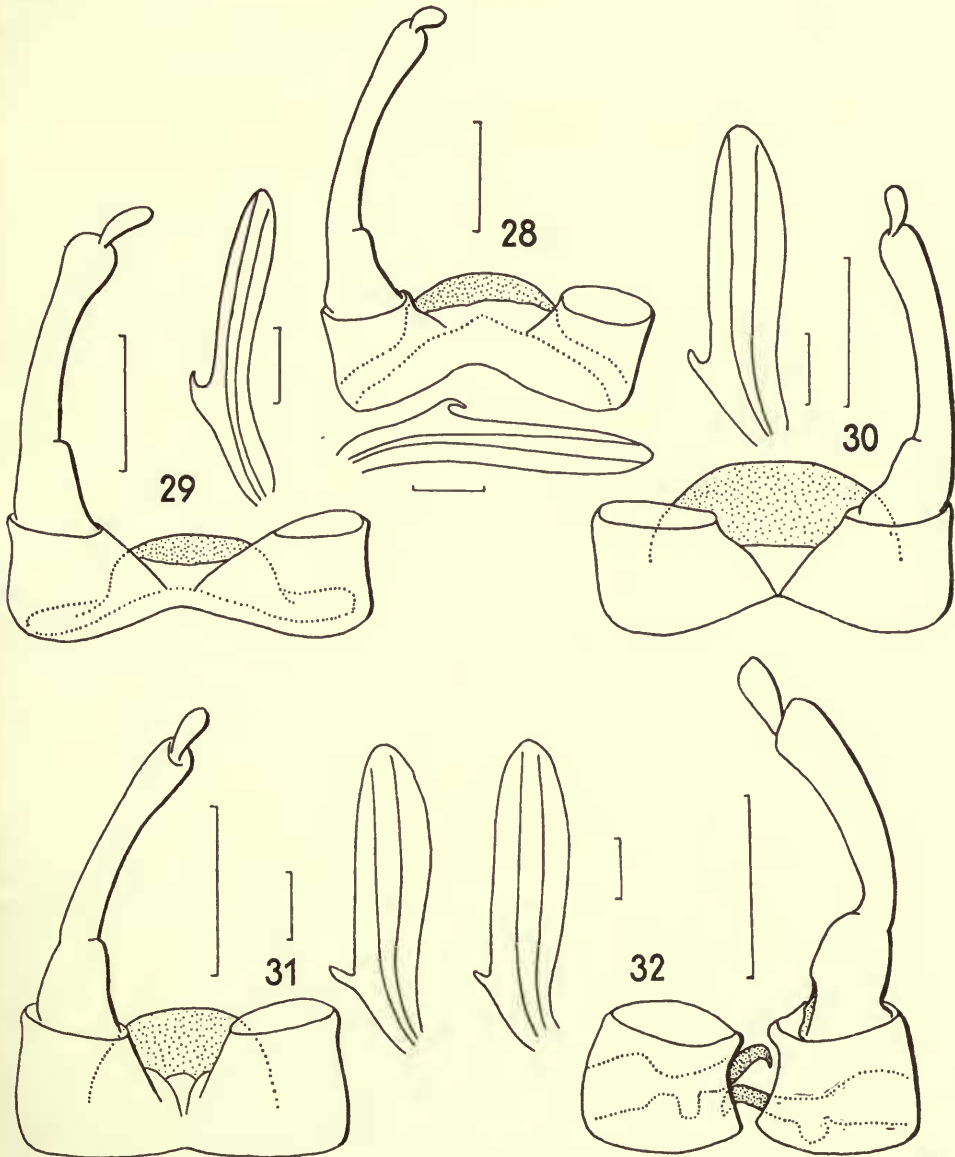
(Text-fig. 30)

LECTOTYPE ♂. Toulouse, Garonne, 21.viii.80. B.M. 1938-674. *Centroptilum pulchrum* Etn., det. A. E. Eaton. LECTOALLOTYPE ♀. Details as above.

Centroptilum stenopteryx Eaton, 1871, p. 110, pl. 6, figs. 15, 15a.

(Text-fig. 31)

LECTOTYPE ♂. McL. type-label (pink). 7.4.59. Zeller. *Centroptilum stenopteryx* Etn., in McLachlan's writing. LECTOALLOTYPE ♀ (subimago). Data as above but lacking date label.



FIGS. 28-32. ♂ Genitalia, ventral and hind wing of *Centroptilum* spp. 28, *C. lacustre* Eaton, type; 29, *C. nemorale* Eaton, type; 30, *C. pulchrum* Eaton, type; 31, *C. stenopteryx* Eaton, type; 32, *C. algericum* Eaton, type. (Scale = 0.2 mm.)

Cloëon bimaculatum Eaton. See *Procloëon*.

Cloëon concinnum Eaton. See *Procloëon*.

Cloëon debilis Walker. See *Procloëon*.

Cloëon simile Eaton, 1870, p. 2.

LECTOTYPE ♂ (in glycerine). Data on cork. *Cloëon simile*. Clumber Park, Notts. ix-x.68. 68-124. Male genitalia figured by Kimmins, 1942a, p. 39, fig. 21S. The lectotype has been transferred to a new tube, the original one having developed a crack.

Cloëon sinense (Walker), 1853, p. 584 (as *Caenis*).

HOLOTYPE ♂. China. 45-65. *Caenis sinensis* (Type) Walker, in Eaton's writing. The type now consists of a head and a portion of the thorax. Eaton wrote in the Departmental copy of Walker's List, "Perhaps identical with *Baëtis* (*Cloëon*) *diptera*. So far as the investing mould permits an examination, no structural differences are apparent between them." Since the type is no longer of any value in identifying Walker's species, I propose to adopt Eaton's supposition and place *sinensis* Walker as a synonym of *Cloëon dipterum* (L.). (Syn. nov.)

Procloëon bimaculatum (Eaton), 1884, pl. 17, fig. 31d; 1885, p. 182 (as *Cloëon*).
(Text-fig. 35)

LECTOTYPE ♀. Designated by Kimmins, 1947, p. 93. LECTOALLOTYPE ♂. Ceylon, Thwaites. B.M. 1938-674. *Cloëon bimaculatum* Etn., det. A. E. Eaton. Contrary to Eaton's description, the lectoallotype male does not have the pigmented pterostigmatic spot. This specimen is the only male in the type series and it is very strange that Eaton should have included this female character in the male diagnosis. As mentioned in my 1947 paper, I took numerous males and females of this species near Calcutta. The males agree in genital structure with the allotype and all have the colourless pterostigma.

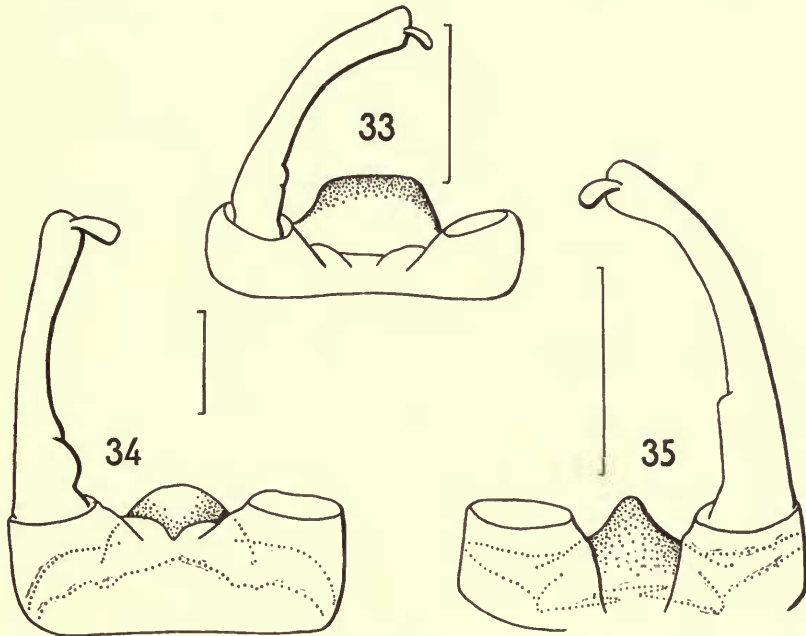
Procloëon concinnum (Eaton), 1885, p. 187 (as *Cloëon*).

LECTOTYPE ♂. Eaton, Portugal, 1880. Porcalhota, near Cintra, 1.vi.80. B.M. 1938-674. *Cloëon concinnum* Etn., det. A. E. Eaton. LECTOALLOTYPE ♀. Data as above. The length of the apparent basal segment of the hind tarsus in relation to the second segment (3 : 1) indicates that this species should be transferred to the genus *Procloëon*.

Procloëon debilis (Walker), 1860, p. 199 (as *Cloëon*).
(Text-fig. 33)

A rather strange situation has arisen regarding the type of this species. Walker's description is very brief; no indication is given of either the sex or the number of specimens before him. In his 1871 monograph (p. 14), Eaton lists the Ephemeroptera types of Walker's 1860 paper in the British Museum (Nat. Hist.) collection, and of *Cloëon debilis* he remarks "1 ♀ im.", and transfers it to the genus *Baëtis*. His examina-

tion appears to have been rather perfunctory or else he made only very brief notes on the type, since on p. 112 of the 1871 monograph he makes no attempt to supplement Walker's very brief account, giving only a slightly *shortened* version of the latin diagnosis, adding "This species can only be identified by the type". Such a remark suggests that he had not at that time seen the type, although in the introduction to this monograph he acknowledges that he had had unlimited access to the B.M. collections. He certainly did at some time examine the type, since Walker's MSS. label "*debilis*" bears the additional words "*Cloëon (Type)*" in Eaton's writing.



FIGS. 33-35. ♂ Genitalia, ventral, of *Procloëon* spp. 33, *P. debilis* (Walker), allotype; 34, *P. concinnum* (Eaton), paratype; 35, *P. bimaculatum* (Eaton), allotype. (Scale = 0.2 mm.)

Above Walker's label are now *two* specimens, both gummed to the same strip of card, rather moulded but, from the appearance of the gum, mounted at the same time. The style of mounting of the specimens is identical with that of the type of *Potamanthus annulifer* Walker, also from Hindostan, and neither the style of the mounting nor the state of the gum suggests that the second specimen has been added since Eaton studied the Walker types. At the tip of the card is a female imago, apices of the wings missing, and nearer the pin is a male imago, which would agree quite as well with Walker's description as does the female (better in fact, as it is in better condition).

If there were originally two specimens, one wonders why Eaton makes no reference to the second one. He may have considered the female to be the type, but this still does not explain why he makes no reference to the second specimen. It is my belief

that there were two specimens and that Eaton started to make notes on them and was interrupted and on his next visit to the Museum forgot to complete them. When he later came to write up his notes, his memory must have let him down and he assumed that there was only the female imago, an error which was perpetuated in the 1884 monograph.

Examination of these two specimens shows that Eaton was incorrect in assigning *debilis* to the genus *Baëtis*, as the marginal intercalaries are single, not paired. This fact also supports my theory that his original examination was rather brief and possibly interrupted. The hind tarsus of the male has the apparent basal segment three times as long as the second and I am therefore transferring Walker's *debilis* to the genus *Procloëon*. *Cloëon debilis* Walker, 1860, having been removed from the genus *Baëtis*, is no longer a homonym of *Baëtis debilis* Walker, 1853.

I therefore consider the types of *Procloëon debilis* (Walker) to be as follows: LECTOTYPE ♀. Designated by Eaton, 1871, p. 14. Hindostan, Saunders, 68-3. *debilis* Wlk., in Walker's writing, with Eaton's addition, *Cloëon (Type)*. LECTOALLOTYPE ♂. On same card as lectotype ♀.

Family LEPTOPHLEBIIDAE

Adenophlebia auriculata (Eaton), 1871, pl. 83, pl. 4, figs. 24, 24a-b (as *Leptophlebia*).

(Text-fig. 36)

LECTOTYPE ♂. McL. type-label (pink). Graham's Town. *Leptophlebia auriculata* Etn., in McLachlan's writing. B.M. 1938-674. Doubtfully distinct from *A. dislocans* (Walker).

Adenophlebia dislocans (Walker), 1860, p. 198 (as *Ephemera*).

HOLOTYPE ♀. Cape. Saunders, 68-3. *Ephemera dislocans (Type)* Walker, in Eaton's writing. One hind wing mounted between cover-glasses by Eaton.

Aprionyx tabularis (Eaton), 1884, p. 91, pl. 10, fig. 16h (as *Atalophlebia*).

The HOLOTYPE of this species, said to be "in spirits", has not been traced. Eaton does not indicate in whose collection it was housed.

Atalophlebia australis (Walker), 1853, p. 538 (as *Ephemera*).

LECTOTYPE ♂. Designated by Tillyard, 1934, p. 13, pl. 2, figs. 7-8. Tillyard also designated a female in his own collection as ALLOTYPE. This specimen does not appear to have been included in that part of his collection which was bequeathed to the British Museum (Nat. Hist.), and is probably in Canberra.

Atalophlebia chilensis Eaton, 1884, p. 91, pl. 10, fig. 16g.

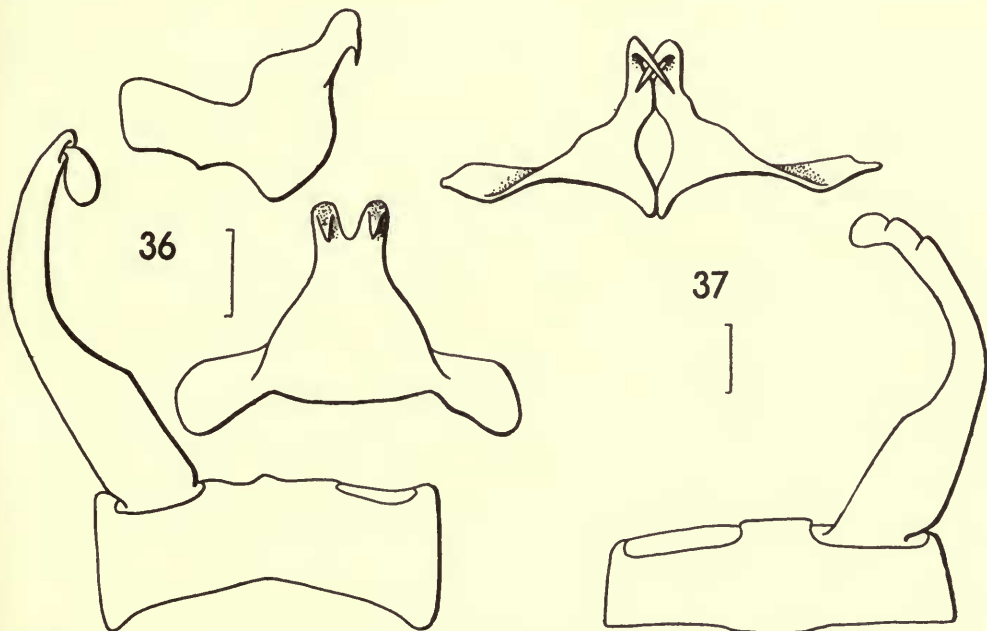
LECTOTYPE ♂. Chili, Reed. B.M. 1938-674. *Atalophlebia chilensis* Etn., det. A. E. Eaton. Male genitalia figured by Demoulin, 1955a, p. 2, fig. 1a.

Atalophlebia dentata (Eaton), 1871, p. 80, pl. 4, figs. 18, 18a-d (as *Leptophlebia*).
(Text-fig. 38)

LECTOTYPE ♂. N. Zeal. 54-4. *Leptophlebia dentata* Eaton, in Eaton's writing.
LECTOALLOTYPE ♀. Data as above.

Atalophlebia inconspicua (Eaton), 1871, p. 79, pl. 4, figs. 17, 17a-b (as *Leptophlebia*).

Five male SYNTYPES from Adelaide in the Hope Department, University Museum, Oxford.



FIGS. 36-37. ♂ Genitalia, ventral, of 36, *Adenophlebia auriculata* (Eaton), type (with penis-lobes in side and ventral view); 37, *Atalophlebia taprobanes* (Walker), type. (Scale = 0.2 mm.)

Atalophlebia nodularis (Eaton), 1871, p. 81, pl. 4, figs. 20, 20a-c (as *Leptophlebia*).
(Text-fig. 41)

LECTOTYPE ♂. McL. type-label (pink). Christchurch, N.Z., Fereday. *Leptophlebia nodularis* Etn., in McLachlan's writing. LECTOALLOTYPE ♀. Data as above.

Atalophlebia scita (Walker), 1853, p. 570 (as *Baëtis*).
(Text-fig. 40)

Only one of the original two specimens can now be traced and this (lacking head) is designated as LECTOTYPE ♂. N. Zeal. 42-55. *Baëtis scita* (Type) Walker, in Eaton's writing.

Atalophlebia taprobanes (Walker), 1853, p. 567 (as *Baëtis*).

(Text-fig. 37)

HOLOTYPE ♂. Ceylon, 52-62. *Baëtis taprobanes* (*Type*) Walker, in Eaton's writing.

In the figure, the lobes of the penis are convergent, with the hooks overlapping. In a paratype of *A. annulatus* (Hagen) they are divergent but capable of folding inwards as in *A. taprobanes*, and it seems not unlikely that *annulatus* will prove to be a synonym of *taprobanes*.

Atalophlebia versicolor Eaton, 1899, p. 286, pl. 10, figs. 2a-b.

(Text-fig. 39)

LECTOTYPE ♂. 41. Wellington, Hudson. B.M. 1938-674. *Atalophlebia versicolor* Etn., det. A. E. Eaton.

Blasturus gravastellus Eaton. See *Leptophlebia*.

Calliarcys humilis Eaton, 1881, p. 21.

(Text-fig. 42)

LECTOTYPE ♂. Foia, 21.v.80. Eaton, Portugal, 1880. B.M. 1938-674. *Calliarcys humilis* Etn., det. A. E. Eaton.

Choroterpes exigua Eaton, 1892a, p. 189.

(Text-fig. 44)

LECTOTYPE ♂. McL. type-label (pink). Tenasserim Valley. *Choroterpes exiguus*, in Eaton's writing. B.M. 1938-674.

Choroterpes inornata Eaton, 1892b, p. 6.

LECTOTYPE ♂. Designated by Kimmins, 1934, p. 340, fig. 2.

Choroterpes lusitanica Eaton, 1881, p. 194.

(Text-fig. 45)

LECTOTYPE ♂. Aldea do Neves, 10.v.80. Eaton, Portugal, 1880. B.M. 1938-674. Now considered a synonym of *Choroterpes picteti* (Eaton).

Choroterpes nervosa Eaton. See *Thraulodes*.

Choroterpes picteti (Eaton), 1871, p. 87 (as *Leptophlebia*).

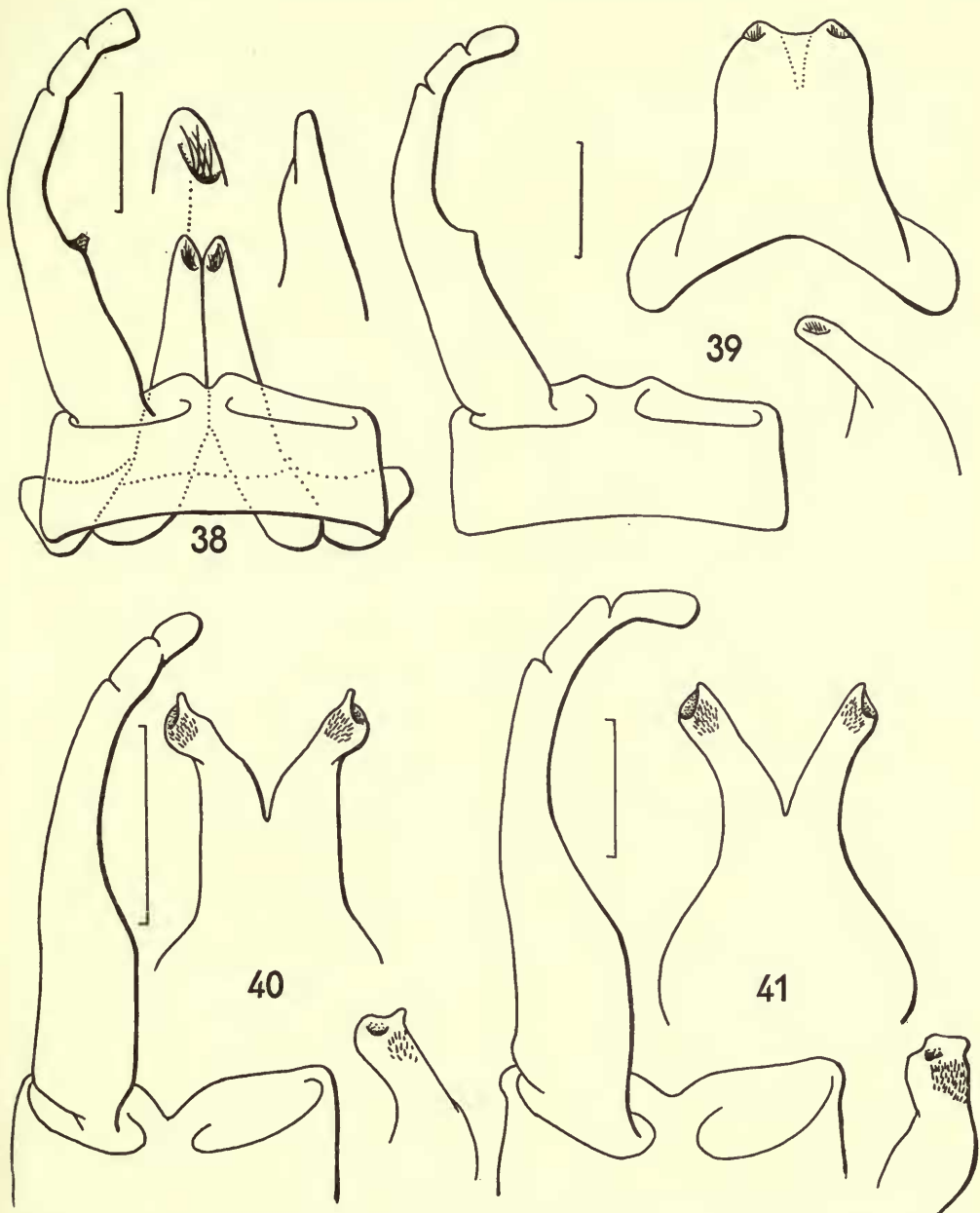
TYPE possibly in the Pictet collection, Geneva.

Choroterpides exiguus (Eaton), 1884, p. 108, pl. 13, fig. 20*2 (as *Thraulus*).

TYPE not traced in Leiden Museum (Lieftinck, i. l., x. 1958).

Deleatidium furcifera (Eaton), 1871, p. 79 (as *Leptophlebia*).

TYPE in National Museum of Victoria, Melbourne. Nat. Mus. Type Registration No. 470. Mr. A. Neboiss writes "it is badly damaged, with right anterior wing and tip of abdomen missing; part of thorax is also damaged."



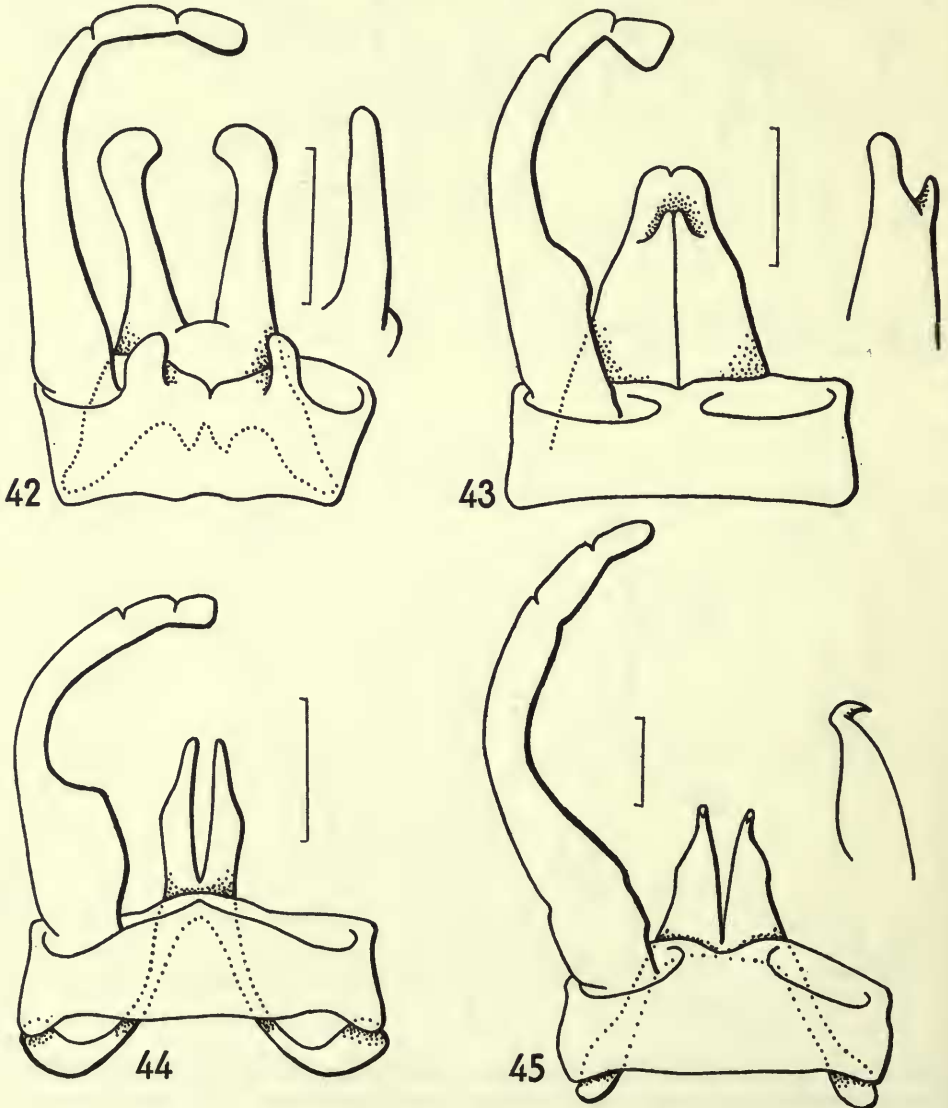
FIGS. 38-41. ♂ Genitalia, ventral (with penis-lobes in side view also) of *Atalophlebia* spp.
 38, *A. dentata* (Eaton), paratype; 39, *A. versicolor* Eaton, type; 40, *A. scita* (Walker),
 type; 41, *A. nodularis* (Eaton), type. (Scale = 0.2 mm.)

Deleatidium lillii Eaton, 1899, p. 289.

(Text-fig. 43)

LECTOTYPE ♂. No. 46. Wellington, Hudson. *Leptophlebia liliei* sp. nov., in Eaton's writing. B.M. 1938-674.

There are no other examples in the McLachlan collection bearing the number 46, the others being numbered 41 and 51. Phillips, 1930, p. 368 is incorrect in

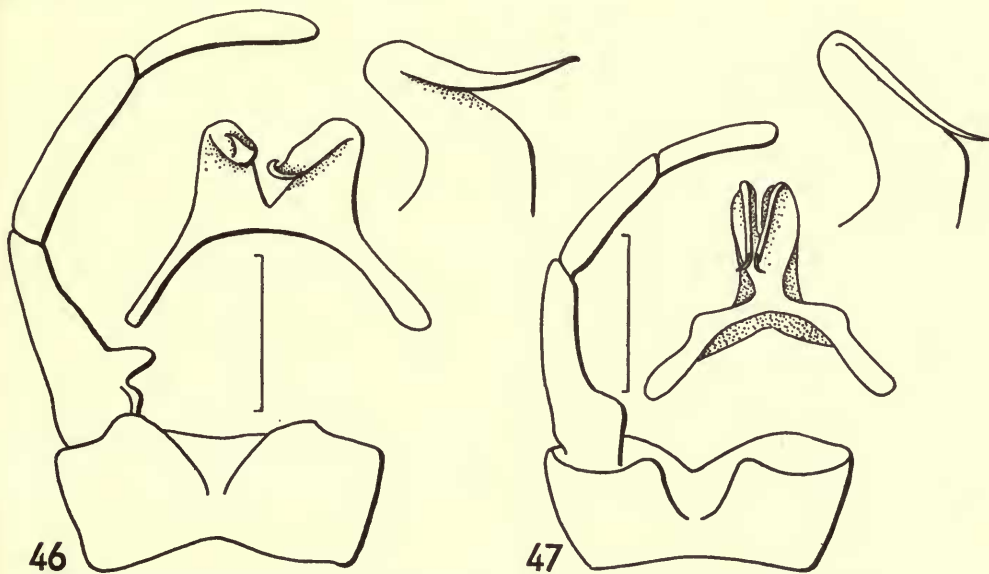


FIGS. 42-45. ♂ Genitalia, ventral (with penis-lobes in side view also) of 42, *Calliarcys humilis* Eaton, type; 43, *Deleatidium lillii* Eaton, type; 44, *Choroterpes exigua* Eaton, type; 45, *Choroterpes lusitanica* Eaton, type. (Scale = 0.2 mm.)

stating that "the winged stages of this insect were first described by Walker under the name *Baëtis scita*, then by Eaton as *Leptophlebia scita* and again as *Atalophlebia scita*." Walker's species is quite distinct.

Deleatidium strigata (Eaton), 1871, p. 80, pl. 4, fig. 19 (as *Leptophlebia*).

HOLOTYPE ♀. McL. type-label (pink). N. Aust. *Leptophlebia strigata* Etn., in McLachlan's writing. B.M. 1938-674.



FIGS. 46-47. ♂ Genitalia, ventral (with penis-lobes in side view also) of *Habrophlebia* spp. 46, *H. nervulosa* Eaton, paratype; 47, *H. umbratilis* Eaton, paratype. (Scale = 0.2 mm.)

Habrophlebia lauta Eaton, 1884, p. 120.

The name *Habrophlebia lauta* was proposed by Eaton to replace Pictet's misidentified *Potamanthus cinctus* (Retzius), and the TYPE should therefore be in the Pictet collection, Geneva. The name *lauta* is sometimes attributed to McLachlan, whose use of it was a *nomen nudum*. He merely quoted Eaton's name, without giving either description or reference to Pictet's name.

Habrophlebia nervulosa Eaton, 1884, p. 117.

(Text-fig. 46)

LECTOTYPE ♂. Eaton, Portugal, 1880. Ponte de Morcelles, 14.vi.80. B.M. 1938-674. *Habrophlebia nervulosa* Etn., det. A. E. Eaton. The specimens from Corsica, figured by Esben-Petersen (1913, *Ent. Medd.* 10: 22, figs. 4-5) as *Habrophlebia nervulosa* Eaton appear to be mis-identified, as they differ in the form of the forceps and of the hind wing.

Habrophlebia umbratilis Eaton, 1884, p. 119.

(Text-fig. 47)

LECTOTYPE ♂. Apennino Pistoiese, Eaton, 1882. 2.viii.82. B.M. 1938-674. *Habrophlebia umbratilis* Etn., det. A. E. Eaton.

Hagenulus caligatus Eaton, 1882, p. 207.

TYPE in Mus. comp. Zool. Cambridge, Mass. There is a female paratype in the British Museum (Nat. Hist.), presented by Dr. Hagen.

Hagenulus monstratus Eaton, 1892a, p. 189.

LECTOTYPE ♂ (subimago). McL. type-label (pink). Tenasserim Valley. *Hagenulus monstratus*. B.M. 1938-674. LECTOALLOTYPE ♀. Data as above.

Hagenulus scotti Eaton, 1913a, p. 433.

(Text-fig. 48)

HOLOTYPE ♂. Mahé, '08-'09. Seychelles Islands. Percy Sladen Trust Expedition. 1910-170. *Hagenulus scotti* Eaton Type.

Leptophlebia auriculata Eaton. See *Adenophlebia*.

Leptophlebia (Blasturus) concinnus (Walker), 1853, p. 553 (as *Palingenia*).

HOLOTYPE ♂. Discussed by Spieth, 1940, p. 327. Male genitalia figured by Traver, 1935, p. 536, fig. 138 (as *cupidus*). Now considered a synonym of *Leptophlebia (Blasturus) cupidus* (Say).

Leptophlebia dentata Eaton. See *Atalophlebia*.

Leptophlebia elongatula McLachlan. See *Ephemerella*.

Leptophlebia furcifera Eaton. See *Deleatidium*.

Leptophlebia (Blasturus) gravastellus Eaton; 1884, p. 102 (as *Blasturus*).

HOLOTYPE ♂. Discussed by Spieth, 1941, p. 96, fig. 1.

Leptophlebia gregalis Eaton. See *Paraleptophlebia*.

Leptophlebia (Blasturus) hebes (Walker), 1853, p. 538 (as *Ephemera*).

The TYPE of this species was considered missing for many years, until Dr. Spieth visited the British Museum (Nat. Hist.) in 1939 and discovered that someone had wrongly attached to the type the label "45. Baëtis". Hagen, in 1857, thinking that this specimen was indeed Walker's No. 45, Baëtis (an undescribed specimen), made it the type of his *Baëtis ignava*, and it was so labelled by Eaton. There is no doubt that the specimen is in fact Walker's *Ephemera hebe*, since in addition to the labels listed by Spieth, 1940, p. 326, there is the B.M. register label, 39.9.26.104, which in the register is given as an *Ephemera* from Newfoundland, presented by W. C. St. John, Esq.

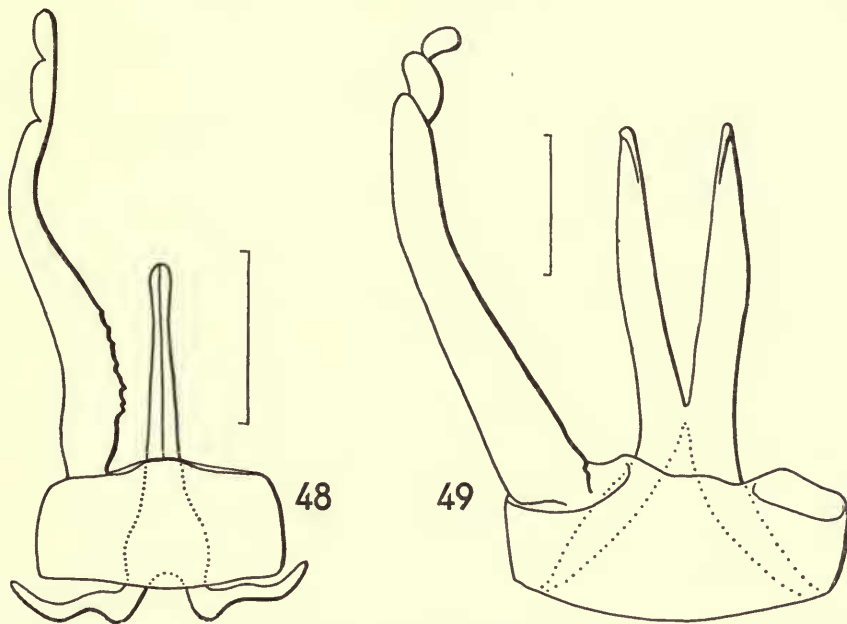
Leptophlebia inconspicua Eaton. See *Atalophlebia*.

Leptophlebia memorialis Eaton. See *Paraleptophlebia*.

Leptophlebia meyeri Eaton, 1884, p. 95.

TYPE probably in the Meyer-Dur collection. Now considered a synonym of *Leptophlebia vespertina* (Linné).

Leptophlebia mollis Eaton. See *Paraleptophlebia*.



FIGS. 48-49. ♂ Genitalia, ventral, of 48, *Hagenulus scotti* Eaton, paratype; 49, *Thraululus bellus* Eaton, type. (Scale = 0.2 mm.)

Leptophlebia (Blasturus) nebulosus (Walker), 1853, p. 554 (as *Palingenia*).

LECTOTYPE ♂. Designated by Spieth, 1940, p. 327. Male genitalia figured by Traver, 1935, p. 536, fig. 138.

Leptophlebia nodularis Eaton. See *Atalophlebia*.

Leptophlebia (Blasturus) pallipes (Walker), 1853, p. 553 (as *Palingenia*).

LECTOTYPE ♀. R. N. Scotia, Redman. *Palingenia pallipes* (Type) Walker, in Eaton's writing. This is the first specimen mentioned by Spieth, 1940, p. 329, who did not specify a lectotype. Now considered a synonym of *Leptophlebia (Blasturus) cupidus* (Say).

Leptophlebia praepedita Eaton. See *Choroerpes*.

Leptophlebia rufivenosa Eaton. See *Paraleptophlebia*.

Leptophlebia strandii Eaton. See *Paraleptophlebia*.

Leptophlebia strigata Eaton. See *Deleatidium*.

Leptophlebia vaciva Eaton. See *Paraleptophlebia*.

Paraleptophlebia debilis (Walker), 1853, p. 569 (as *Baëtis*).

HOLOTYPE ♀. Discussed by Spieth, 1940, p. 333.

Paraleptophlebia gregalis (Eaton), 1884, p. 98 (as *Leptophlebia*).

LECTOTYPE ♂. Designated by Spieth, 1941, p. 94, fig. 6.

Paraleptophlebia memorialis (Eaton), 1884, p. 98 (as *Leptophlebia*).

TYPE in Mus. comp. Zool. Cambridge, Mass. (*L. memorialis* was a new name for *L. pallipes* Hagen).

Paraleptophlebia mollis (Eaton), 1871, p. 88, pl. 4, fig. 28 (as *Leptophlebia*).

Specimen in Mus. comp. Zool. Cambridge, Mass. is labelled "Box I, A. E. Eaton" but without type label.

Paraleptophlebia praepedita (Eaton), 1884, p. 99, pl. 11, fig. 17c (as *Leptophlebia*).

LECTOTYPE ♂. Designated by Spieth, 1941, p. 94. Male genitalia figured by Traver, 1935, p. 524, fig. 134.

Paraleptophlebia rufivenosa (Eaton), 1884, p. 99 (as *Leptophlebia*).

LECTOTYPE ♀. Designated by Spieth, 1941, p. 96.

Paraleptophlebia strandii (Eaton), 1901, p. 253, fig. 1 (as *Leptophlebia*).

According to Brekke, 1938, p. 60 (footnote), the Strand collection, from which this species was described, has not been located.

Paraleptophlebia vaciva (Eaton), 1884, p. 97 (as *Leptophlebia*).

LECTOTYPE ♂. Designated by Spieth, 1941, p. 96. Male genitalia figured by Traver, 1935, p. 522, fig. 133.

Thraulodes colombiae (Walker), 1853, p. 537 (as *Ephemera*).

HOLOTYPE ♀. Columbia, 47-71. *Ephemera colombiae* (Type) Walker, in Eaton's writing.

Thraulodes hilaris (Eaton), 1892b, p. 8 (as *Thraulus*).

LECTOTYPE ♂. Designated by Kimmins, 1934, p. 345, fig. 10.

Thraulodes laetus (Eaton), 1884, p. 110, pl. 13, fig. 23*3 (as *Thraulus*).

HOLOTYPE ♂. New Granada, Nolcken. *laetus*. B.M. 1938-674. *Thraulus laetus* Etn., TYPE, D. E. Kimmins det. 1950. The type now lacks the apex of its abdomen.

Thraulodes lepidus (Eaton), 1884, p. 109 (as *Thraulus*).

HOLOTYPE ♂. Chiriqui. *Thraulus lepidus*, in Eaton's writing. B.M. 1938-674. The genitalia of the type agree with the figure given by Kimmins, 1934, p. 343, fig. 7.

Thraulodes mexicanus (Eaton), 1884, p. 109, pl. 13, fig. 23*4 (as *Thraulus*).

HOLOTYPE ♂ in Brussels Museum.

Thraulodes nervosa (Eaton), 1892*b*, p. 6, pl. 1, figs. 6, 6*a* (as *Choroterpes*).

HOLOTYPE ♂. Discussed by Kimmins, 1934, p. 344, fig. 8.

Thraulus bellus Eaton, 1881, p. 195.

(Text-fig. 49)

LECTOTYPE ♂. Cintra, 1. vi. 80. Eaton, Portugal, 1880. B.M. 1938-674. *Thraulus bellus* Etn., det. A. E. Eaton. One hind wing mounted between cover-glasses, one fore wing between celluloid.

Thraulus exiguus Eaton. See *Choroterpes*.

Thraulus hilaris Eaton. See *Thraulodes*.

Thraulus laetus Eaton. See *Thraulodes*.

Thraulus lepidus Eaton. See *Thraulodes*.

Thraulus mexicanus Eaton. See *Thraulodes*.

Thraulus primanus Eaton. See *Traverella*.

Thraulus versicolor Eaton. See *Traverella*.

Traverella primanus (Eaton), 1892*b*, p. 7, pl. 1, figs. 7, 7*a* (as *Thraulus*).

LECTOTYPE ♂. Designated by Kimmins, 1934, p. 342 (apex of abdomen missing).

Traverella versicolor (Eaton), 1892*b*, p. 7, (as *Thraulus*).

LECTOTYPE ♀. Designated by Kimmins, 1934, p. 342, fig. 6.

Family EPHEMERELLIDAE

Ephemerella (Chitonophora) aronii (Eaton), 1908, p. 149 (as *Ephemerella*).

The TYPE of this species should be the male collected in Finland by Dr. J. E. Aro (after whom the species is named). This specimen may be in the Helsinki Museum. The allotype ♀ and a paratype ♀ are probably in the Tromsø Museum. The female collected by Eaton and given to McLachlan has been found, labelled by Eaton as *Ephemerella* sp., in the McLachlan accessions. It is a subimago and has been labelled paratype. The species is now considered a synonym of *Ephemerella (Chitonophora) aurivillii* Bengtsson.

Ephemerella (Drunella) fuscata (Walker), 1853, p. 570 (as *Baëtis*).

LECTOTYPE ♂. Designated by McDunnough, 1931, p. 214, fig. 2. Walker's species is a homonym of *Baëtis fuscata* Stephens and was renamed *Ephemerella walkeri* by Eaton.

Ephemerella (Drunella) grandis (Eaton), 1884, p. 128, pl. 14, fig. 24b (as *Ephemerella*).

LECTOTYPE ♀. Designated by Spieth, 1941, p. 96.

Ephemerella (Drunella) walkeri (Eaton), 1884, p. 129 (as *Ephemerella*).

TYPE as for *E. (D.) fuscata* (Walker).

Ephemerella elongatula (McLachlan), 1875, p. 169 (as *Leptophlebia*).

LECTOTYPE ♀. Japan, Pryer. *Leptophlebia elongatula* McL. B.M. 1938-674. The female subimago, stated by Eaton, 1884, p. 131 to be a *Heptagenia*, has not been traced.

Ephemerella hispanica Eaton, 1887, p. 306.

TYPE ♂ probably in Pictet collection, Geneva, allotype ♀ in Leiden Museum.

Ephemerella inermis Eaton, 1884, p. 127.

TYPES in Mus. comp. Zool., Cambridge, Mass.

Ephemerella invaria (Walker), 1853, p. 568 (as *Baëtis*).

LECTOTYPE ♂. Example with abdomen mounted on microscope slide, designated by McDunnough, 1925, p. 213, fig. 6.

Ephemerella notata Eaton, 1887, p. 305, pl. 65, fig. 9.

LECTOTYPE ♂. Salkeld, 18.vi.86. *Ephemerella notata* Etn., det. A. E. Eaton. B.M. 1938-674. LECTOALLOTYPE ♀. As above, date 20.vi.86. Male genitalia figured by Kimmins, 1942a, p. 28, fig. 10N.

Ephemerella (Timpanoga) hecuba (Eaton), 1884, p. 133, pl. 40, figs. 1-17 (as *Ephemerella*, figs. as *Ephemera hecuba* Hagen).

TYPE NYMPH not traced in Mus. comp. Zool., Cambridge, Mass. (W. L. Brown, Jr., i. l. 23.x.1958). Spieth, 1941, p. 87, when dealing with the Eaton types in the British Museum (Nat. Hist.) remarks "The alcoholic material of the Eaton collection is not yet available for study, and I therefore did not see the nymphal type of *Ephemerella hecuba* Eaton." Eaton however states that this material is in the Mus. comp. Zool., Cambridge, Mass.

Teloganodes major Eaton, 1884, p. 136.

LECTOTYPE ♀ (subimago). Ceylon, 63-9. *Teloganodes major* Etn., in Eaton's writing.

Family TRICORYTHIDAE

Leptohyphes brevissimus Eaton, 1892b, p. 12, pl. 1, fig. 9.

LECTOTYPE ♀. Designated by Kimmins, 1934, p. 347, fig. 12.

Leptohyphes eximius Eaton, 1882, p. 208.

TYPE in Mus. comp. Zool., Cambridge, Mass.

Tricorythodes explicatus (Eaton), 1892b, p. 11, pl. 1, figs. 8, 8a (as *Tricorythus*).

LECTOTYPE ♂. Designated by Kimmins, 1934, p. 346. Male genitalia figured by McDunnough, 1931a, p. 266, fig. 13.

Family CAENIDAE

Caenis cibaria Eaton, 1879, p. 268.

LECTOTYPE ♂. Lake Nyassa, 79-26. *Caenis cibaria* ♂ *Type*, in Eaton's writing. *Caenis cibaria* Etn., ♂ *Type*, D. E. Kimmins det. 1947. LECTOALLOTYPE ♀. Data as above. *Caenis cibaria* ♀ *Type*. *Caenis cibaria* Etn., ♀ *allotype*, D. E. Kimmins det. 1947. Male genitalia figured by Kimmins, 1949, p. 832, fig. 6.

Caenis diminuta Walker, 1853, p. 584.

HOLOTYPE ♂. Discussed by Spieth, 1940, p. 337. Male genitalia figured by McDunnough, 1931a, p. 258, fig. 2.

Caenis kungu Eaton, 1879, p. 268.

HOLOTYPE ♂. Lake Nyassa, 79-26. *Caenis kungu* ♂ *Type*. ALLOTYPE ♀. Same data. *Caenis kungu* ♀ *Type*. Male genitalia figured by Kimmins, 1949, p. 832, fig. 7.

Caenis lactella Eaton, 1884, p. 144.

New name for *Caenis lactea* Pictet. TYPE in Pictet collection.

Caenis perpusilla Walker, 1853, p. 585.

HOLOTYPE ♂. (Ceylon. Locality label now missing.) *Caenis perpusilla* (*Type*) Walker, in Eaton's writing. The type is in fairly good condition.

Caenis rivulorum Eaton, 1884, p. 143 (as var. *rivulorum* of *C. halterata*).

I have been able to trace only one example in the McLachlan collection belonging to the type-series. LECTOTYPE ♂. Thorncombe, Dorset, 1882. *rivulorum* Etn. B.M. 1938-674. *Caenis halterata*, var. *rivulorum* Etn. *Type*, D. E. Kimmins det. 12.iii.42.

Caenis robusta Eaton, 1884, p. 145.

LECTOTYPE ♂. Netherlands, Eaton, 1879. Gouda, 29.vii.1879. B.M. 1938-674. *Caenis robusta* Etn., det. A. E. Eaton. LECTOALLOTYPE ♀. Data as above, date 31.vii.1879. Male genitalia figured by Kimmins, 1954, p. 117, fig. 1.

Caenis sinense Walker. See *Cloëon*.

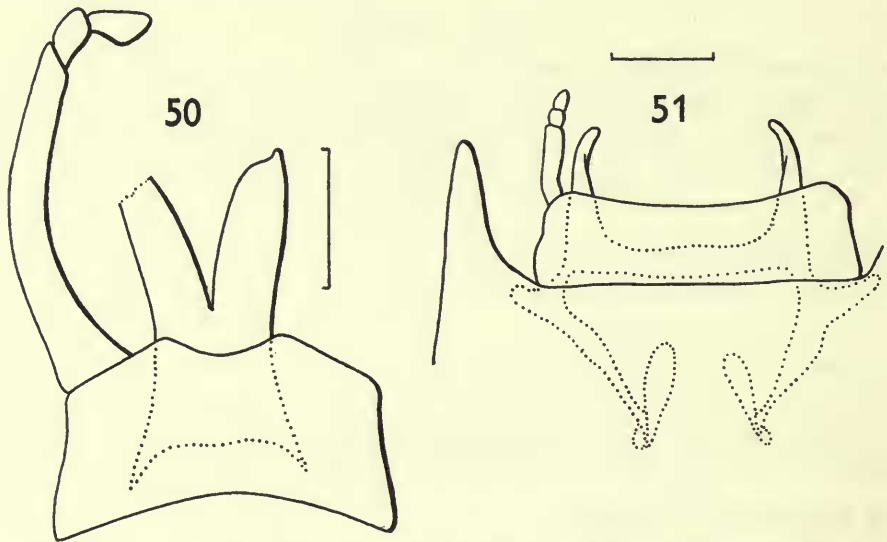
Family POTAMANTHIDAE

Potamantellus amabilis (Eaton), 1892a, p. 188 (as *Rhoenanthus*).

(Text-fig. 51)

LECTOTYPE ♂. McL. type-label (pink). Tenasserim Valley. *Rhoenanthus amabilis*, in Eaton's writing. B.M. 1938-674.

Potamantus expectans Walker. See *Ephemera*.



FIGS. 50-51. ♂ Genitalia, ventral, of 50, *Potamantodes formosus* (Eaton), type; 51, *Potamantellus amabilis* (Eaton), type. (Scale = 0.2 mm.)

Potamantodes formosus (Eaton), 1892a, p. 186 (as *Potamantus*).

(Text-fig. 50)

LECTOTYPE ♂. McL. type-label (pink). Tenasserim Valley. *Potamantus formosus* ♂, in Eaton's writing. B.M. 1938-674. LECTOALLOTYPE ♀. Data as above.

Rhoenanthus amabilis Eaton. See *Potamantellus*.

Rhoenanthus speciosus Eaton, 1881, p. 192.

Dr. M. A. Lieftinck informs me (i. l. x. 1958) that the collections of the Mus. Soc. Zool. "Natura artis magistra" are not at Leiden, as recorded by Eaton, but at the Amsterdam Museum. He kindly made enquiries there and learns that the TYPES of *Rhoenanthus speciosus* cannot be found.

Family EUTHYPLOCIDAE

Campylocia anceps (Eaton), 1883, p. 38, pl. 4, fig. 7c (as *Euthyplocia*).

(Text-fig. 52)

HOLOTYPE ♂. Rio Mauhes, Trail. *Euthyplocia anceps* Etn. B.M. 1938-674. It seems doubtful whether the examples figured by Ulmer, 1942, pl. 1, figs. 3a, b are conspecific with the type.

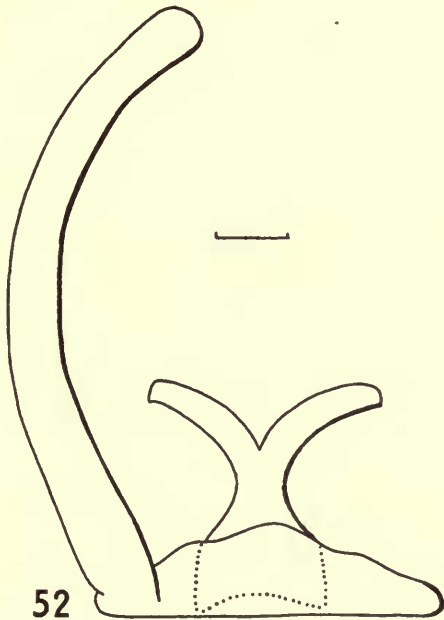


FIG. 52. ♂ Genitalia, ventral, of *Campylocia anceps* (Eaton), type. (Scale = 0.2 mm.)

Family EPHEMERIDAE

Eatonica illustris (Eaton), 1913, p. 276 (as *Hexagenia*).

HOLOTYPE ♂. Uganda Protectorate, Mpanga Forest, Toro, 4,800 ft., 12-23.xi. 1911. S. A. Neave. *Hexagenia illustris* sp. nov., in Eaton's writing. Now considered a synonym of *Eatonica schoutedeni* Navás.

Ephemera australis Walker. See *Atalophlebia*.

Ephemera colombiae Walker. See *Thraulodes* (Leptophlebiidae).

Ephemera consors Eaton, 1892c, p. 412.

(Text-fig. 57)

TYPES ♂ and ♀ originally in Indian Museum, Calcutta : now possibly in Zoological Survey of India collection, Calcutta. One male and two female paratypes in British Museum (Nat. Hist.).

Ephemera decora Walker, 1853, p. 537.

HOLOTYPE ♂. Discussed by Spieth, 1940, p. 325. Now considered a synonym of *E. simulans* Walker.

Ephemera dislocans Walker. See *Adenophlebia*.

Ephemera exspectans (Walker), 1860, p. 198 (as *Potamanthus*).

HOLOTYPE ♀. (subimago). Hindostan. Saunders, 68-3. *exspectans* Walk., in Walker's writing. *Potamanthus exspectans* (Type) Walker, in Eaton's writing. I have reverted to the spelling of the specific name (*exspectans*) as given in the original publication, on Walker's label and in Eaton, 1871. Eaton gives no explanation (1883, p. 72) of the reason for changing the spelling to *expectans*.

Ephemera hebes Walker. See *Leptophlebia*.

Ephemera hudsoni McLachlan. See *Ichthybotus*.

Ephemera immaculata Eaton, 1871, p. 74.

HOLOTYPE ♂ (very battered), in Hope Dept., University Museum, Oxford.

Ephemera japonica McLachlan, 1875, p. 169.

LECTOTYPE ♂. McL. type-label (pink). Japan, Pryer. *Ephemera japonica* McL., in McLachlan's writing. B.M. 1938-674. LECTOALLOTYPE ♀. Data as above, McL. type-label missing.

Ephemera lineata Eaton, 1870, p. 1.

LECTOTYPE ♂ (in glycerine). Data on cork, *Ephemera lineata* ♂ *im.* The B.M. register No. 68-124 gives the following additional information "*Ephemera lineata* Etn., Mss., Reading". Male genitalia figured by Kimmins, 1942a, p. 20, fig. 4L.

Ephemera natata (Walker), 1853, p. 551 (as *Palingenia*).

LECTOTYPE ♀ (subimago). Hudson's Bay, 44-17. 251 or 650. *Ephemera natata*. *Palingenia natata* (Type) Walker, in Eaton's writing.

Ephemera orientalis McLachlan, 1875, p. 168.

HOLOTYPE ♂ in Leiden Museum.

Ephemera pictiventris McLachlan, 1894, p. 428.

LECTOTYPE ♀. McL. type-label (pink). Ta-chien-lu. *Ephemera pictiventris* McL., in McLachlan's writing. B.M. 1938-674.

Ephemera pulcherrima Eaton, 1892a, p. 185.

HOLOTYPE ♀ (subimago). McL. type-label (pink). Tenasserim Valley. *Ephemera pulcherrima*, in Eaton's writing. B.M. 1938-674.

Ephemera remensa Eaton, 1892c, p. 410.

(Text-fig. 54)

HOLOTYPE ♂ originally in the Indian Museum, Calcutta ; now possibly in Zoological Survey of India collection, Calcutta. ALLOTYPE ♀. McL. type-label (pink). Musuri, 7,000 ft., June, Lang. *Ephemera remensa*, in Eaton's writing. B.M. 1938-674. There is also a male paratype in the British Museum (Nat. Hist.), from which Text-fig. 54 was made.

Ephemera serica Eaton, 1871, p. 75, pl. 4, figs. 12, 12a.

(Text-fig. 53)

LECTOTYPE ♂. Hongkong, 61-49. *Ephemera serica* (Type) Eaton, in Eaton's writing. LECTOALLOTYPE ♀. N. China. 54-8. *Ephemera serica* (Type) Eaton, in Eaton's writing. The head and thorax of the lectotype has been destroyed by pests.

Ephemera simulans Walker, 1853, p. 536.

HOLOTYPE ♂ (subimago). Discussed by Spieth, 1940, p. 326.

Ephemera strigata Eaton, 1892, p. 302.

(Text-fig. 55)

LECTOTYPE ♂. McL. type-label (pink). Japan, Pryer. *Ephemera strigata* Etn., in McLachlan's writing. B.M. 1938-674. LECTOALLOTYPE ♀. Data as above, with addition, Gifu, Apr.-May, 1886.

Ephemera supposita Eaton, 1883, p. 72, pl. 8, fig. 12c.

TYPES in Mus. comp. Zool. Cambridge, Mass. (New name for *Potamanthus fasciatus* Hagen *partim*).

Ephemera varia Eaton, 1883, p. 69, pl. 63, fig. 12h.

TYPES in Mus. comp. Zool., Cambridge, Mass. (New name for *Ephemera decora* Hagen).

Hexagenia albivitta (Walker), 1853, p. 566 (as *Baëtis*).

LECTOTYPE ♂. Braz. 52-44. *Baëtis albivitta* (Type) Walker, in Eaton's writing.

Hexagenia angulata (Walker), 1853, p. 564 (as *Baëtis*).

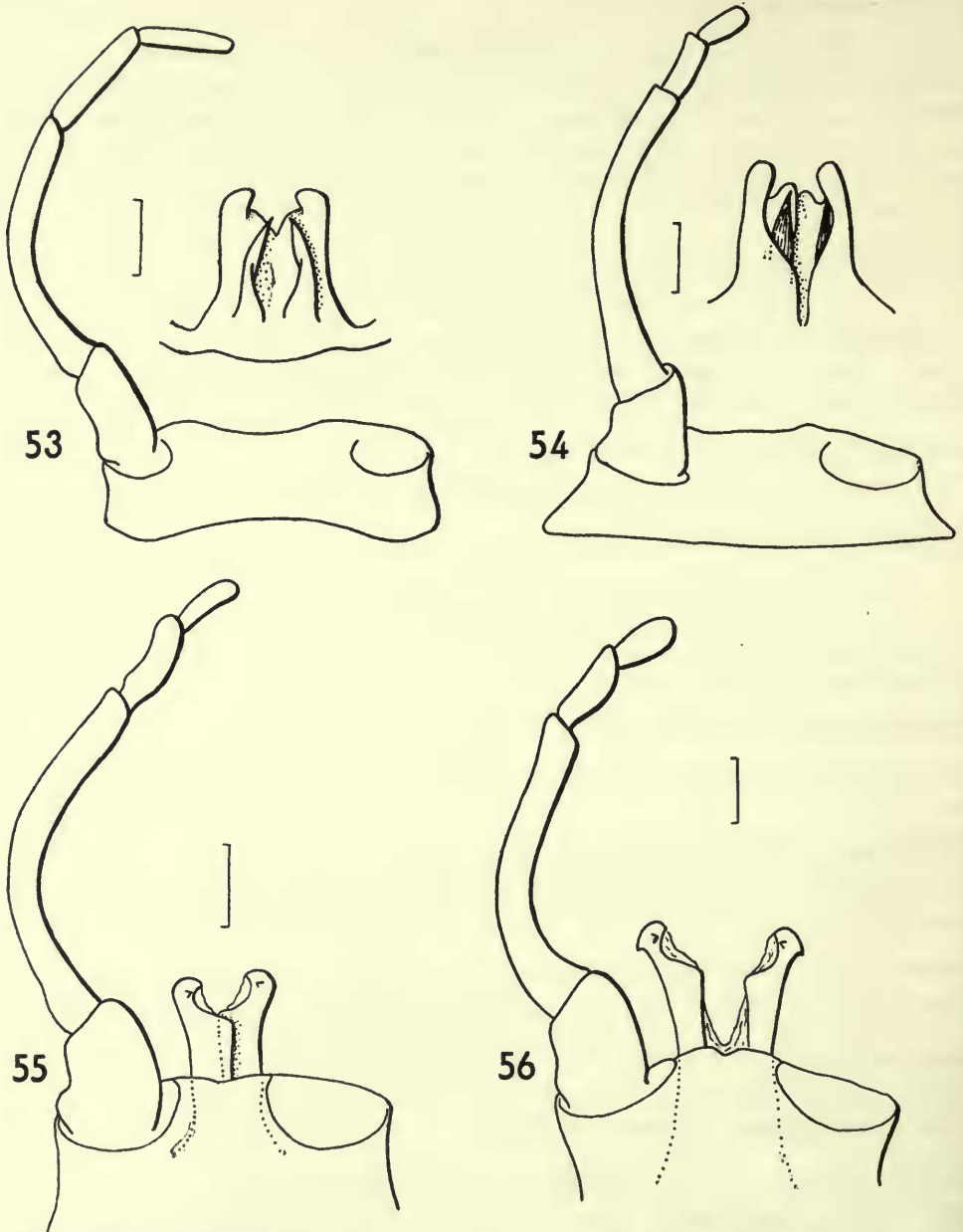
HOLOTYPE ♂. Discussed by Spieth, 1940, p. 332. Placed by Spieth as a synonym of *Hexagenia limbata viridescens* (Walker).

Hexagenia continua (Walker), 1860, p. 199 (as *Palingenia*).

HOLOTYPE ♂ (subimago). Amaz. Saunders, 68-3. *continua* Walk., in Walker's writing. *Palingenia continua* (Type) Walker, in Eaton's writing. Now considered a synonym of *Hexagenia albivitta* (Walker).

Hexagenia illustris Eaton. See *Eatonica*.

Hexagenia mexicana Eaton. See *Pseudeatonica*.



FIGS. 53-56. ♂ Genitalia, ventral, of *Ephemera* spp. 53, *E. serica* Eaton, type; 54, *E. remensa* Eaton, paratype; 55, *E. japonica* McLachlan, paratype; 56, *E. strigata* Eaton, paratype. (Scale = 0.2 mm.)

Hexagenia munda Eaton, 1883, p. 53.

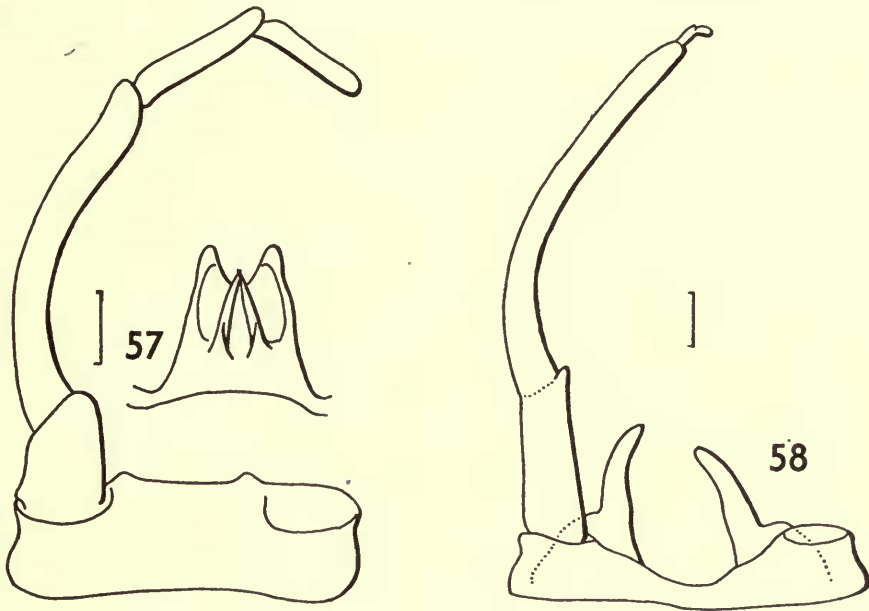
TYPES in Mus. comp. Zool., Cambridge, Mass.

Hexagenia occulta (Walker), 1853, p. 551 (as *Palingenia*).

LECTOTYPE ♂ (subimago). Designated by Spieth, 1940, p. 328.

Hexagenia variabilis Eaton, 1883, p. 55.

New name for *Palingenia limbata* Pictet. TYPE possibly in the Pictet collection, Geneva.



FIGS. 57-58. ♂ Genitalia, ventral, of 57, *Ephemera consors* Eaton, paratype; 58, *Hexagenia albivitta* (Walker), type. (Scale = 0.2 mm.)

Hexagenia venusta Eaton, 1883, p. 54.

LECTOTYPE ♂. Designated by Spieth, 1941, p. 88.

Hexagenia viridescens (Walker), 1853, p. 551 (as *Palingenia*).

HOLOTYPE ♀ (subimago). Re-described by Spieth, 1940, p. 329.

Ichthybotus hudsoni (McLachlan), 1894a, p. 270 (as *Ephemera*).

(Text-fig. 59)

LECTOTYPE ♂. McL. type-label (pink). New Zealand. *Ephemera hudsoni* McL., in McLachlan's writing. B.M. 1938-674. LECTOALLOTYPE ♀ (subimago). McL. type-label (pink). New Zealand, Hudson. 32. *Ephemera hudsoni* McL., in McLachlan's writing. B.M. 1938-674.

Pseudeatonica mexicana (Eaton), 1883, p. 50 (as *Hexagenia*).

HOLOTYPE ♂. In Mus. comp. Zool., Cambridge, Mass.

Family POLYMITARCIDAE

Asthenopus curtus (Eaton), 1868, p. 84 (as *Campsurus*).

(Text-fig. 60)

HOLOTYPE ♂. Para, 45-56. *Palingenia albifilum* Walker, var., in Kimmins' writing. *Palingenia curta* (Type) Hagen Ms., and *Asthenopus curtus* (Type) Eaton,

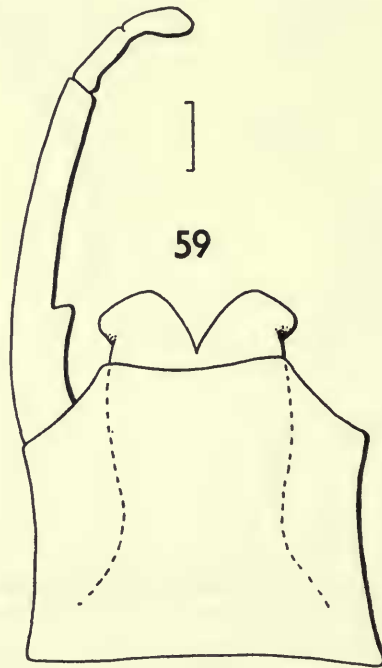


FIG. 59. ♂ Genitalia, ventral, of *Ichthybotus hudsoni* McLachlan, example from Hudson collection. (Scale = 0.2 mm.)

in Eaton's writing. Ulmer's figure, 1942, p. 2, fig. 13, differs considerably in the shape of the penis-lobes and may possibly represent another species.

Campsurus albifilum (Walker), 1853, p. 554 (as *Palingenia*).

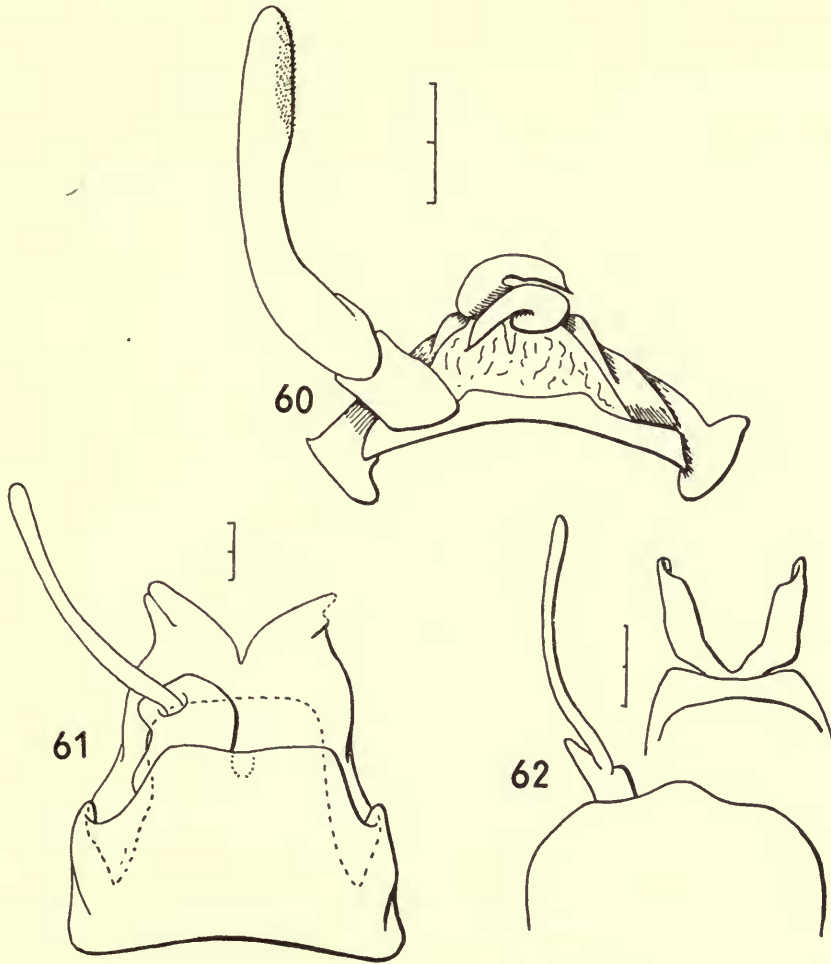
(Text-fig. 61)

HOLOTYPE ♂. Para, 45-56. *Palingenia albifilum* (Type) Walker, in Eaton's writing.

Campsurus curtus Eaton. See *Asthenopus*.

Campsurus cuspidatus Eaton, 1871, p. 58, fig. 12.

Two syntypes in Brussels Museum, of which I designate the more complete as LECTOTYPE.



FIGS. 60-62. ♂ Genitalia, ventral, of 60, *Asthenopus curtus* (Eaton), type; 61, *Campsurus albifilum* (Walker), type; 62, *Campsurus latipennis* (Walker), type (dissected from subimago). (Scale = 0.2 mm.)

Campsurus latipennis (Walker), 1853, p. 554 (as *Palingenia*).

(Text-fig. 62)

LECTOTYPE ♂. Para, 49-1. *Palingenia latipennis* (Type) Walker, in Eaton's writing. LECTOALLOTYPE ♀. Details as above. The lectotype is a partially moulted subimago, and the genitalia have been cleared in caustic potash solution and withdrawn from the subimagonal skin for figuring. They are consequently very transparent.

Campsurus quadridentatus Eaton, 1871, p. 58, pl. 3, fig. 13.

HOLOTYPE ♂ in Dale collection, University Museum, Oxford.

Family PALINGENIIDAE

Anagenesia ampla Eaton, 1883, p. 26, pl. 1, fig. 1c (as *Palingenia* (*Anagenesia*)).

(Text-fig. 63)

LECTOTYPE ♂. SAR. (Wallace). Borneo, 56-14. *Anagenesia ampla* Etn., Type, D. E. Kimmins det. 1950. The 2 ♂, 1 ♀ in the Selys collection, mentioned by Ulmer (1924a, p. 30) as labelled SAR., and later (1939, p. 458) indicated by him as "Typen" are no doubt part of the type-series, although Eaton did not specify how many examples he had studied, nor to which collection they belonged. I do not consider that Ulmer's citation of "Typen" can be interpreted as designation of a lectotype.

Anagenesia javanica Eaton, 1883, p. 27, pls. 1, 2, figs. 1d (as *Palingenia* (*Anagenesia*)).

TYPES in Leiden Museum.

Anagenesia lata (Walker), 1853, p. 550 (as *Palingenia*).

(Text-fig. 64)

LECTOTYPE ♂. Silhet, 45-33. 10. *Palingenia lata*.

Anagenesia minor (Eaton), 1892c, p. 408 (as *Palingenia*).

TYPES originally in Indian Museum, Calcutta; now possibly in collection of Zoological Survey of India, Calcutta. One male paratype in British Museum (Nat. Hist.).

Anagenesia robusta (Eaton), 1892c, p. 407 (as *Palingenia*).

TYPE ♂ originally in Indian Museum, Calcutta; now possibly in collection of Zoological Survey of India, Calcutta. One male paratype in British Museum (Nat. Hist.).

Anagenesia tenera Eaton, 1883, p. 27, pl. 2, fig. 1e (as *Palingenia* (*Anagenesia*)).

HOLOTYPE ♂ in Leiden Museum.

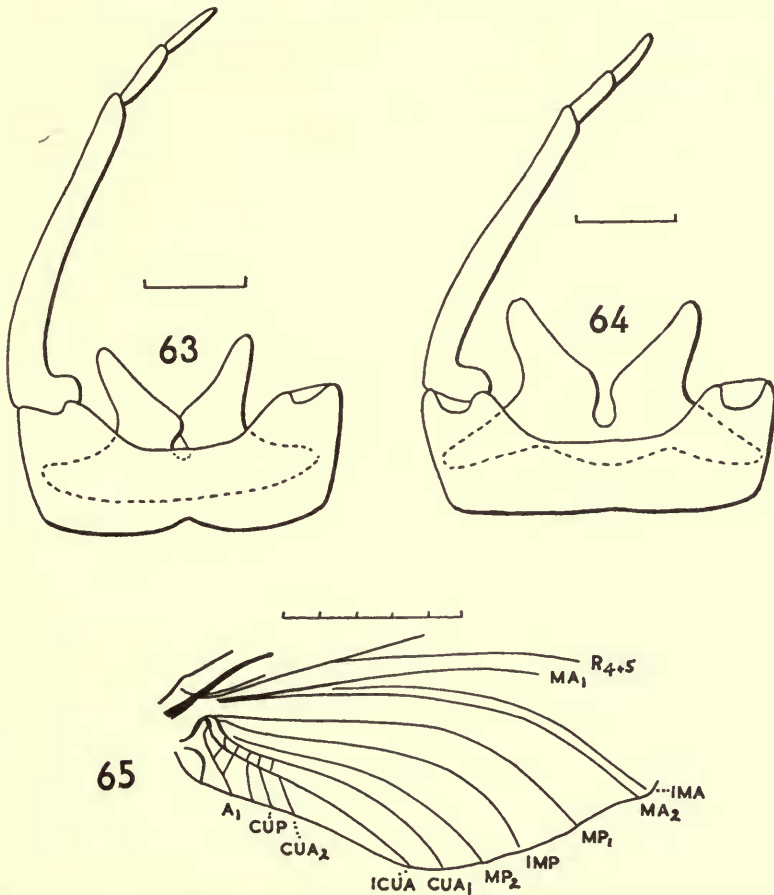
Chankagenesia sibirica (McLachlan), 1872, p. 50 (as *Palingenia*).

(Text-fig. 65)

HOLOTYPE ♂. McL. type-label (pink). Irkutsk, 20.v.66. *Palingenia sibirica* McL., in McLachlan's writing. B.M. 1938-674.

In the original description, McLachlan has somewhat magnified the extent of the damage to the type. Both hind wings and part of the right fore wing are now missing, as are most of the legs, the cerci and all but the basal part of the forceps. The remains of the wings have now been removed, softened and mounted as microscope preparations. On comparing them with the figure of this species given by Demoulin (1952, fig. 2),

two differences are noted. Firstly MA forks very definitely basal of the origin of Rs, much more so than in Demoulin's figure. Secondly, the vein CUP appears to fuse with ICUA for a short distance, the basal part of the latter vein simulating a cross-vein. CUP then diverges from ICUA and runs to the wing margin. My figure is a composite one, based upon the left fore wing (reversed), with the details of the



FIGS. 63-65. 63, *Anagenesia ampla* Eaton, ♂ type, genitalia ventral; 64, *A. lata* (Walker), ♂ type, genitalia, ventral. (Scale = 1 mm.) 65, *Chankagenesia sibirica* (McLachlan), ♂ type, base of fore wing. (Scale = 5 mm.)

base filled in from the right fore wing, this part being damaged in the left wing. I am not figuring what is left of the male genitalia, as the penis-lobes are somewhat uniform and lacking in specific characters.

Palingenia albifilum Walker. See *Campsurus* (Polymitarcidae).

Palingenia ampla Eaton. See *Anagenesia*.

Palingenia annulifer Walker. See *Ecdyonurus*.

- Palingenia bicolor* Walker. See *Isonychia*.
- Palingenia concinna* Walker. See *Leptophlebia*.
- Palingenia continua* Walker. See *Hexagenia*.
- Palingenia humeralis* Walker. See *Coloburiscus* (Isonychiidae).
- Palingenia ignota* Walker. See *Isonychia*.
- Palingenia javanica* Eaton. See *Anagenesia*.
- Palingenia lata* Walker. See *Anagenesia*.
- Palingenia latipennis* Walker. See *Campsurus*.
- Palingenia minor* Eaton. See *Anagenesia*.
- Palingenia natata* Walker. See *Ephemera*.
- Palingenia nebulosa* Walker. See *Leptophlebia*.
- Palingenia occulta* Walker. See *Hexagenia*.
- Palingenia papuana* Eaton. See *Plethogenesia*.
- Palingenia remota* Walker. See *Coloburiscus*.
- Palingenia robusta* Eaton. See *Anagenesia*.
- Palingenia sibirica* McLachlan. See *Chankagenesia*.
- Palingenia tenera* Eaton. See *Anagenesia*.
- Palingenia viridescens* Walker. See *Hexagenia*.
- Palingenia vitrea* Walker. See *Iron*.
- Plethogenesia papuana* (Eaton), 1879a, p. 398, figs. a-f (as *Palingenia*).

TYPES in fluid in Mus. civ. Stor. nat. Genova. The examples in fluid in the McLachlan collection are apparently lost, as no such material came to the British Museum (Nat. Hist.) with the pinned collection in 1938.

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